

BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH

CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF PHYSICS

M.Sc Physics syllabus

Degree	Batch	Dept	Sem	FT-code	Subject	Cr
PG	2018	PS	1	P18MCPH101	CORE-1: MATHEMATICAL PHYSICS-I	4
PG	2018	PS	1	P18MCPH102	CORE-2: CLASSICAL MECHANICS	4
PG	2018	PS	1	P18MCPH103	CORE-3: QUANTUM MECHANICS	4
PG	2018	PS	1	P18MCPH1L1	CORE-4: GENERAL PHYSICS LABORATORY -I	3
PG	2018	PS	1	P18MCPH1L2	CORE-5: ELECTRONICS LABORATORY -I	3
PG	2018	PS	1	P18MEPH011	MAJOR ELE- I: SOLAR PHOTOVOLTAIC TECHNOLOGY	4
PG	2018	PS	1	P18MEPH012	MAJOR ELE- I: FIBER OPTICS	
PG	2018	PS	1	P18MEPH013	MAJOR ELE- I: THINFILM TECHNOLOGY	
PG	2018	PS	2	P18MCPH201	CORE-6: MATHEMATICAL PHYSICS – II	4
PG	2018	PS	2	P18MCPH202	CORE-7: ELECTROMAGNETIC THEORY	4
PG	2018	PS	2	P18MCPH203	CORE-8: STATISTICAL MECHANICS	4
PG	2018	PS	2	P18MCPH2L1	CORE-9: GENERAL PHYSICS LABORATORY - II	3
PG	2018	PS	2	P18MCPH2L2	CORE-10: ELECTRONICS LABORATORY - II	3
PG	2018	PS	2	P18MEPH021	MAJOR ELE-I I: CRYSTAL PHYSICS & X-RAY DIFFRACTION	4
PG	2018	PS	2	P18MEPH022	MAJOR ELE-I I: PHOTONICS	
PG	2018	PS	2	P18MEPH023	MAJOR ELE-I I: MAGNETISM	
PG	2018	PS	2	P18EEPH1V1	INTERNSHIP PROGRAM	1
PG	2018	PS	3	P18MCPH301	CORE 11: SOLID STATE PHYSICS	4
PG	2018	PS	3	P18MCPH302	CORE 12: ATOMIC AND MOLECULAR SPECTROSCOPY	4
PG	2018	PS	3	P18MCPH303	CORE 13: NUCLEAR AND PARTICLE PHYSICS	4
PG	2018	PS	3	P18MCPH304	CORE 14: NUMERICAL METHODS IN “C” PROGRAMMING	4
PG	2018	PS	3	P18MCPH3L1	CORE 15: GENERAL PHYSICS LABORATORY - III	3
PG	2018	PS	3	P18MEPH3L2	CORE-16: ELECTRONICS LABORATORY - III	3
PG	2018	PS	3	P18ACEN001	AUDIT COURSE ENGLISH FOR RESEARCH PAPER WRITING	0
				P18ACCE002	DISASTER MANAGEMENT	
				P18ACEN003	SANSKRIT FOR TECHNICAL KNOWLEDGE	
				P18ACBA004	VALUE EDUCATION	
				P18ACLW005	CONSTITUTION OF INDIA	
				P18ACBA006	PEDAGOGY STUDIES	
				P18ACBA007	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	
PG	2018	PS	4	P18MCPH401	CORE-17: ELECTRONICS	4
PG	2018	PS	4	P18MCPH402	CORE-18: MICROCONTROLLER-8086 & INSTRUMENTATION	4

PG	2018	PS	4	P18MEPH031	MAJOR ELE III:NANOSCIENCE AND NANOTECHNOLOGY	4
PG	2018	PS	4	P18MEPH032	MAJOR ELE III:LASER AND APPLICATIONS	
PG	2018	PS	4	P18MEPH033	MAJOR ELE III:ASTRONOMY & ASTROPHYSICS	
PG	2018	PS	4		OPEN ELECTIVE	2
			4	P18MCYO001	STRESS MANAGEMENT BY YOGA	0
PG	2018	PS	4	P18PRPH4T1	TERM PAPER	1
PG	2018	PS	4	P18PRPH4P1	PROJECT WORK	8
					TOTAL	90

P18MCPH101	MATHEMATICAL PHYSICS – I							L	T	P	C
	Total Contact Hours - 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES: To introduce basic mathematical topics necessary to understand and appreciate various physical laws of nature.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about vector analysis and associated theorems										
CO2	Learn about Orthogonal and special coordinates systems										
CO3	Learn about special type of matrices that are relevant in physics										
CO4	Learn different ways of solving first and second order differential equations										
CO5	Gain knowledge in probability distributions and theorems										
CO6	To execute and learn about the equation such as Legendre equations – Frobenius method – Bessel equation.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PS O2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg. Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I VECTOR ANALYSIS**12**

Definition of vectors – scalar and vector product – triple products – gradient, divergence, curl – vector integration – Gauss's theorem – Green's theorem – Stoke's theorem – Dirac delta function – Helmholtz theorem

UNIT II CURVED COORDINATES, TENSORS**12**

Orthogonal coordinates – differential vector operators: gradient, divergence, curl – special coordinate systems: rectangular, spherical, cylindrical – tensors of rank two – contraction, direct product – quotient rule.

UNIT III LINEAR ALGEBRA**12**

Determinants – matrices – inner product, direct product – orthogonal matrices – Euler angles – symmetry properties – relation to tensors – Pauli matrices – eigenvalue equation and diagonalization – Cayley-Hamilton theorem – functions of matrices – Hermitian matrices.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS**12**

First order equation – second order homogeneous equation – Wronskian – second solution – inhomogeneous equation – forced oscillation and resonance – power series method – Hermite and Legendre equations – Frobenius method – Bessel equation.

UNIT V PROBABILITY**12**

Definition – basic theorems – permutation and combination – method of counting – random variables – binomial and Poisson distributions – normal distribution – central limit theorem

TEXT BOOK:

1. G. B. Arfken and H.J. Weber, *Mathematical Methods for Physicists*, 5th edition, Academic Press (2001).
2. E. Kreyszig, *Advanced Engineering Mathematics*, 8th edition, John Wiley & Sons Inc. (1999).
3. *Mathematical Methods in the Physical Sciences*, 3rd edition, Mary L. Boas, Wiley-India (2011).
4. M. D. Greenberg, *Advanced Engineering Mathematics*, 2nd Edition, PHI, NJ, 1998

REFERENCE BOOKS

1. L.A. Pipes and L.R. Harvill, *Applied Mathematics for Engineers and Physicists*, McGraw-Hill (1970) and Gregory Paul Bertoni (Feb 29, 2008)

P18MCPH102	CLASSICAL MECHANICS							L	T	P	C
	Total Contact Hours - 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES : The course aims to develop an understanding of simplified treatments of many complex problems in classical mechanics.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about Newton’s laws of motion to solve advanced problems involving the dynamic motion of classical mechanical systems										
CO2	Learn about differential calculus and other advanced mathematical techniques pertaining to the development of Lagrangian and Hamiltonian formulations of classical mechanics.										
CO3	Solve the dynamical problems using conservation laws.										
CO4	Learn Hamiltonian equations and Poisson brackets.										
CO5	Gain knowledge in special theory of relativity										
CO6	Understand the simplification treatment of various solutions in classical mechanics										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PS O2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I LAGRANGIAN AND HAMILTONIAN FORMULATION **12**
Mechanics of a system of particles – constraints – Lagrangian equation of motion from D'Alembert's and Hamilton's principles – conservation of linear momentum, energy and angular momentum – applications of the Lagrangian formalism.

UNIT II CENTRAL FORCE PROBLEM **12**
Reduction to an one body problem – equation of motion and first integrals – one dimensional problems and classification of orbits – Kepler problem – scattering in a central potential – Rutherford formula – scattering cross section – transformation to laboratory frames.

UNIT III RIGID BODY AND OSCILLATING SYSTEM **12**
Elements of rigid-body dynamics – Euler angles – symmetric top and applications – small oscillations – normal mode analysis – normal modes of a linear tri-atomic molecule – forced oscillations – effect of dissipative forces on free and forced oscillations – damped driven pendulum.

UNIT IV HAMILTONIAN FORMULATION **12**
Legendre transformation – Hamiltonian equations of motion – cyclic coordinates – phase space and Liouville's theorem – Poisson brackets.

UNIT V SPECIAL THEORY OF RELATIVITY **12**
Inertial frames – principle and postulate of relativity – Lorentz transformations – length contraction, time dilation and the Doppler effect – velocity addition formula – four-vector notation – energy-momentum – four-vector for a particle – relativistic invariance of physical laws.

TEXT BOOK:

1. H. Goldstein, C. Poole and J. Safko, Classical Mechanics, 3rd edition, Addison & Wesley (2000).
2. W. Greiner, Classical Mechanics, Springer-Verlag (2003).
3. W. Greiner, Classical Mechanics – Point particles and Relativity, Springer (1989).
4. Classical Mechanics, Rana and Joag, Tata McGraw-Hill Education
5. Classical Mechanics, J. C. Upadhyaya, Himalaya Publishing House, 2007

REFERENCE BOOKS

1. I.C. Percival and D. Richards, Introduction to Dynamics, Cambridge University Press (1983).
 2. J.V. Jose and E.J. Saletan, Classical Dynamics: A Contemporary Approach, Cambridge University Press (1998).
- E.T. Whittaker, A Treatise on the Analytical Dynamics of Particles and Rigid Bodies, 4th edition, Cambridge University Press (1989).

P18MCPH103		QUANTUM MECHANICS							L	T	P	C
		Total Contact Hours – 60							3	1	0	4
		Prerequisite – B.Sc Physics										
		Course Designed by – Department of Physics										
COURSE OBJECTIVES: The course aims to develop an understanding of simplified treatments of many complex problems in classical mechanics.												
COURSE OUTCOMES (COs)												
CO1	Gain knowledge about Newton’s laws of motion to solve the various problems											
CO2	Learn about differential calculus and other advanced mathematical techniques pertaining to the development of Lagrangian and Hamiltonian formulations of classical mechanics.											
CO3	Solve the dynamical problems using conservation laws.											
CO4	Learn Hamiltonian equations and Poisson brackets.											
CO5	Gain knowledge in special theory of relativity											
CO6	To learn about advanced problems involving the dynamic motion of classical mechanical systems											
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3	
2	CO1	H	H						H			
	CO2	H	H									
	CO3	M	M									
	CO4	M	H									
	CO5	H	H									
	CO6	H	H									
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)		
					✓							
4	Approval	Academic Council Meeting										

UNIT I SCHRODINGER EQUATION

12

Inadequacy of classical theory – de-Broglie hypothesis of matter waves – Heisenberg's uncertainty relation – Schrödinger's wave equation – physical interpretation and conditions on wave function – eigenvalues and eigenfunctions – particle in a square-well potential – potential barrier – tunneling.

UNIT II OPERATORS AND EIGENFUNCTIONS

12

Linear operator – orthogonal systems and Hilbert space – expansion in eigenfunctions – Hermitian operators – canonical commutation – commutations and uncertainty principle – state with minimum uncertainty

UNIT III SOLVABLE PROBLEMS

12

Harmonic oscillator – operator method – Schrödinger equation for spherically symmetric potentials – angular momentum operator – condition on solutions and eigenvalues – spherical harmonics – rigid rotor – radial equation of central potential – hydrogen atom – degenerate states.

UNIT IV ANGULAR MOMENTUM AND SPIN

12

Eigenvalues of angular momentum \mathbf{J} – matrix representation of \mathbf{J} – electron spin – Stern – Gerlach experiment – Zeeman effect – addition of angular momentum – Clebsch-Gordan coefficients – identical particles with spin – Pauli's exclusion principle.

UNIT V APPROXIMATION METHODS

12

Perturbation theory for non-degenerate states – removal of degeneracy – Stark effect – variation method – WKB approximation – Bohr-Sommerfeld quantum condition – perturbative solution for transition amplitude – selection rules – Fermi Golden rule – scattering of a particle by a potential.

TEXT BOOK:

1. P.M. Mathews and K. Venkatesan, A Textbook of Quantum Mechanics, Tata McGraw Hill (1976).
2. J.L. Powell and B. Crasemann, Quantum Mechanics, Narosa Publishing House (1993).
3. J.J. Sakurai, Modern Quantum Mechanics, Addison-Wesley (1999).
4. Quantum Mechanics, Aruldas, Prentice Hall of India (2006).

REFERENCE BOOKS

1. L.I. Schiff, Quantum Mechanics, McGraw-Hill (1968).
2. D.J. Griffiths, Introduction to Quantum Mechanics, Pearson Education (2005).
3. N. Zettili, Quantum Mechanics: Concepts and Applications, John Wiley (2009).
4. L.D. Landau and E.M. Lifshitz, Quantum Mechanics (Non-relativistic Theory), 3rd edition, Elsevier (2011).

P18MCPH1L1	GENERAL PHYSICS LABORATORY					L	T	P	C		
	Total Contact Hours – 45					3	1	0	4		
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To introduce the basic concepts of physics through hands on experience and impart experimental skill to students.											
COURSE OUTCOMES (COs)											
CO1	Understand the fundamental physics behind many scientific discoveries through hands on experience.										
CO2	Applying theoretical knowledge in practical experiments										
CO3	Developing technical skills to collect data and analyze the results										
CO4	Understand the internal properties of given material										
CO5	To resolve the equations, data's and graphs with real-time experiments										
CO6	To gain the knowledge of instrumentation techniques										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

- 1.. Hall Effect in Semiconductor
2. Non-Destructive Testing – Ultrasonics
3. Two Probe Method for Resistivity Measurement
4. Wavelength Measurement of Laser using Diffraction Grating
5. Numerical Aperture of an Optical Fiber
6. Electron Spin Resonance
7. Specific Heat Capacity of Solids
8. Half Shade Polarimeter and Strain Viewer
9. Michelson Interferometer
10. Acoustic Diffraction

TEXT BOOK:

1. General Physics Laboratory Manual, Department of Physics.

REFERENCE BOOKS

1. R.A. Dunlap, Experimental Physics: Modern Methods, Oxford University Press, New Delhi (1988).
2. E.V. Smith, Manual for Experiments in Applied Physics, Butterworths (1970).
3. D. Malacara (ed.), Methods of Experimental Physics, Series of Volumes, Academic Press Inc. (1988).

P18MCPH1L2	ELECTRONICS LABORATORY -I							L	T	P	C
	Total Contact Hours – 45							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
OBJECTIVES: To introduce the various concepts of basic electronics and circuits through hands on experience..											
COURSE OUTCOMES (COs)											
CO1	Analyze the significance of laws involved in electric circuits										
CO2	Understand the basics of operational amplifier										
CO3	To learn about the basics to construct and solve the mathematical equation.										
CO4	Apply the principles of electronics in day to life										
CO5	To design and construct the electrical and electronics circuits and interpret the results.										
CO6	Apply the characteristics of electronic devices in practicals										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

LIST OF EXPERIMENTS

1. Solving Simultaneous Equations
2. Voltage Controlled Oscillator
3. Op-Amp Arithmetic Operations
4. Op-Amp Square, Ramp Generator and Wien Bridge Oscillator
5. Op-Amp Precision Full Wave Rectifier
6. Multiplexer and De-multiplexer
7. Regulated Power Supply using IC 723
8. UJT-Characteristics of Relaxation Oscillator
9. Logarithmic and Anti-logarithmic Amplifier
10. Phase Shift Oscillator

TEXT BOOK:

1. Electronics Laboratory Manual, Department of Physics, NITT.

REFERENCE BOOKS

1. B.K. Jones, Electronics for Experimentation and Research, Prentice-Hall (1986).
2. P.B. Zbar, A.P. Malvino and M.A. Miller, Basic Electronics: A Text-Lab Manual, Tata Mc-Graw Hill, New Delhi (1994).

P18MCPH201	MATHEMATICAL PHYSICS – II	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite – B.Sc Physics				
	Course Designed by – Department of Physics				

COURSE OBJECTIVES: To introduce basic mathematical topics necessary to understand and appreciate various physical laws of nature..

COURSE OUTCOMES (COs)	
CO1	Gain knowledge about Fundamental concepts of mathematical series and theorem
CO2	Learn about complex variable for an Cauchy equations and Cauchy's residue theorem
CO3	Understand about functions of matrices
CO4	Learn Introduction to group theory
CO5	Gain knowledge differential equations an Poisson equation
CO6	Understand and apply the green function to solve the various problems

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PS O3	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg. Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I INFINITE SERIES**12**

Fundamental concepts – convergence test: Cauchy's ratio test, Gauss's test – alternating series – algebra of series – Taylor expansion – Binomial theorem – power series – asymptotic series – Stirling's formula.

UNIT II COMPLEX ANALYSIS**12**

Functions of complex variable – derivative and Cauchy-Riemann equation – line integral – Cauchy's integral theorem – Cauchy's integral formula – Laurent series – Cauchy's residue theorem – poles – evaluation of residues – evaluation of definite integrals.

UNIT III INTEGRAL TRANSFORMS**12**

Determinants – matrices – inner product, direct product – orthogonal matrices – Euler angles – symmetry properties – relation to tensors – Pauli matrices – eigenvalue equation and diagonalization – Cayley-Hamilton theorem – functions of matrices – Hermitian matrices.

UNIT IV GROUP THEORY**12**

Introduction to group theory – generators of continuous groups – rotation groups and angular momentum – $SU(2)$ - $SO(3)$ homomorphisms – orbital angular momentum – discrete groups – character table – irreducible representation.

UNIT V PARTIAL DIFFERENTIAL EQUATIONS**12**

Vibrating string – D'Alembert's solution of wave equation – diffusion equation – solution by Fourier series – Poisson equation – method of separation of variables – Green's function method.

TEXT BOOK:

1. G. B. Arfken and H.J. Weber, *Mathematical Methods for Physicists*, 5th edition, Academic Press (2001).
2. E. Kreyszig, *Advanced Engineering Mathematics*, 8th edition, John Wiley & Sons Inc. (1999).
3. *Mathematical Methods in the Physical Sciences*, 3rd edition, Mary L. Boas, Wiley-India (2011).

REFERENCE BOOKS

1. L.A. Pipes and L.R. Harvill, *Applied Mathematics for Engineers and Physicists*, McGraw-Hill (1970) and Gregory Paul Bertoni (Feb 29, 2008)

P18MCPH202	ELECTROMAGNETIC THEORY							L	T	P	C
	Total Contact Hours – 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To understand the nature of electric and magnetic force fields and the intricate connection between them.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about divergence and curl and field of an electric dipole										
CO2	Learn about magnetic potential magnetization										
CO3	Understanding about Maxwell’s equations for an electromagnetic energy										
CO4	Learn Electromagnetic wave equation										
CO5	Gain knowledge Reflection and refraction at the boundary of region										
CO6	Understand the wave and its dynamics										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO1	PS O2
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I ELECTROSTATICS**12**

Electric field – divergence and curl – electric potential – conductors – Laplace equation (1D, 2D and 3D) – uniqueness theorem – separation of variables: Cartesian and spherical coordinates – field of an electric dipole – polarization – Gauss’s law in dielectrics – linear dielectrics – energy density – boundary value problems

UNIT II MAGNETOSTATICS**12**

Lorentz force – magnetic induction – electric current – equation of continuity – Biot-Savart law – magnetic potential – magnetization – Ampere’s law in magnetized material – energy density – linear and nonlinear media.

UNIT III MAXWELL’S EQUATIONS**12**

Faraday’s law – generalization of Ampere’s law – Maxwell’s equations – boundary conditions – scalar and vector potentials – gauge invariance – electromagnetic energy – Poynting’s theorem.

UNIT IV ELECTROMAGNETIC WAVES**12**

Electromagnetic wave equation (without source) – solution of 3D wave equation – propagation of EM waves in non-conducting media – waves in conducting media – polarization.

UNIT V WAVES IN BOUNDED REGION**12**

Reflection and refraction at the boundary of non-conducting media – Fresnel’s coefficients – Brewster’s angle and critical angle – reflection from a conducting plane – wave guide – TE and TM waves – rectangular wave guide.

TEXT BOOK:

1. D. J. Griffiths, Introduction to Electrodynamics, Prentice Hall of India, 3rd edition (1999).
2. J.R. Reitz., F.J. Milford and R.W. Christy, Foundations of Electromagnetic Theory, 4th edition, Pearson (2010).

REFERENCE BOOKS

1. J.D. Jackson, Classical Electrodynamics, Wiley-India, 3rd edition (2011).
2. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, 2nd edition, Prentice Hall of India (1998).
3. W. Greiner, Classical Electrodynamics, 3rd edition, Springer (2010).
4. L.D. Landau and E.M. Lifshitz, Electrodynamics of Continuous Media, 2nd edition, Elsevier (2008).

P18MCPH203	STATISTICAL MECHANICS						L	T	P	C	
	Total Contact Hours – 60						3	1	0	4	
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES : To learn the connection between macroscopic and microscopic state of a system of large number of particles.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about thermodynamic relations of laws										
CO2	Learn about theory of ensembles										
CO3	Understand various properties of matter and radiation in thermal equilibrium through appropriate statistics.										
CO4	Understand Solid State Physics.										
CO5	Gain knowledge Reflection and refraction at the boundary of region										
CO6	To remember the various concepts of mathematical functions										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I THERMODYNAMICS**12**

Ideal gas law – exact differentials – first law, internal energy, heat capacity – second law, Carnot's cycle, Carnot's theorem, absolute temperature – Clausius theorem, entropy – thermodynamic potentials, Maxwell's relations – chemical potential – third law.

UNIT II THEORY OF ENSEMBLES**12**

Postulates: phase space, microstates, density of states, ensemble average – Liouville's theorem – microcanonical ensemble – quantum phase space – canonical ensemble – partition function (N particle) – ideal gas law – grand canonical ensemble.

UNIT III MAXWELL-BOLTZMANN STATISTICS**12**

Boltzmann system (identical, distinguishable particles) – Maxwell-Boltzmann distribution – Lagrange's multipliers – partition function (single particle) – thermodynamics of gases – equipartition theorem – paramagnetic susceptibility.

UNIT IV BOSE-EINSTEIN STATISTICS**12**

Principle of indistinguishability – Bosons – Bose-Einstein distribution – Planck's law of radiation – Stefan's law – Einstein model of phonons (semi-classical) – Debye's theory of heat capacity of solids.

UNIT V FERMI-DIRAC STATISTICS**12**

Fermions – Fermi-Dirac distribution – Fermi energy – electron gas in metals – thermionic emission – Pauli paramagnetism

TEXT BOOK:

1. M.W. Zeemansky and R.H. Dittman, Heat and Thermodynamics, 8th edition, Mc-Graw Hill (2011).
2. K. Haug, Statistical Mechanics, 2nd edition, Wiley India (2010).
3. F.W. Sears and G.L. Salinger, Thermodynamics, Kinetic Theory and Statistical Thermodynamics, 3rd edition, Narosa Publishing House (1998).

REFERENCE BOOKS

1. Enrico Fermi, Thermodynamics, Dover (1956).
2. R.K. Pathria and Paul D. Beale, Statistical Mechanics, 3rd edition, Academic Press (2011).
3. F. Reif, Fundamentals of Statistical and Thermal Physics, International Students edition, Tata McGraw-Hill (1988).
4. S.J. Blundell and K.M. Blundell, Concepts in Thermal Physics, Oxford University Press (2006).
5. L.D. Landau and E.M. Lifshitz, Statistical Physics – Part I, 3rd edition, Elsevier (2010).

P18MCPH2L1	GENERAL PHYSICS LABORATORY -II							L	T	P	C
	Total Contact Hours – 45							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To introduce the basic concepts of physics through hands on experience and impart experimental skill to students.											
COURSE OUTCOMES (COs)											
CO1	Understand the fundamental physics behind many scientific discoveries through hands on experience.										
CO2	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.										
CO3	Understand the application side of the experiments										
CO4	Use of basic laws to study the spectral properties and optical properties of the given prism and grating. .										
CO5	Understand the usage of basic laws and theories to determine various properties of the materials given.										
CO6	Analyze the detail about practical importance to be aware of the concepts from the basis.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

LIST OF EXPERIMENTS

1. Vacuum Pumps – Low Pressure Measurement and Determination of Pumping Speed
2. Zeeman effect
3. Hydrogen Spectra and Rydberg Constant
4. Forbe's Method – Thermal Conductivity of Metal
5. Kundt's Tube
6. Solar-Cell Characteristics
7. Magnetic Susceptibility of Liquids – Quincke's Method
8. Curie Temperature of Magnetic Materials
9. Dielectric Constant and Curie Temperature of Ferroelectric Ceramics
10. Hysteresis (B – H Curve)
11. Helmholtz Galvanometer
12. Faraday Effect
13. Millikan Oil Drop Experiment – e/m of Electron
14. Determination of Planck's Constant
15. Cornu's Method – Determination of Elastic Constants of Transparent Materials.

TEXT BOOK:

1. General Physics Laboratory Manual, Department of Physics.

REFERENCE BOOKS

1. R.A. Dunlap, Experimental Physics: Modern Methods, Oxford University Press, New Delhi (1988).
2. E.V. Smith, Manual for Experiments in Applied Physics, Butterworths (1970).
3. D. Malacara (ed.), Methods of Experimental Physics, Series of Volumes, Academic Press Inc. (1988).

P18MCPH2L2	ELECTRONICS LABORATORY -II						L	T	P	C	
	Total Contact Hours – 45						3	1	0	4	
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To introduce the various concepts of basic electronics and circuits through hands on experience..											
COURSE OUTCOMES (COs)											
CO1	Understand the fundamental physics behind electronic circuits used in many modern devices through hands on experience.										
CO2	Learn about different circuits										
CO3	Learn about amplifier in CE										
CO4	Learn about the electrical circuits										
CO5	Gain knowledge in digital electrical circuits										
CO6	How to create electronic circuits used in many modern devices through hands on experience.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

LIST OF EXPERIMENTS

1. Astable and monostable Multivibrator using IC555
2. Combinational Logic Circuit Design
3. IC 555 timer – Schmitt Trigger
4. Wien's Bridge oscillator using operational amplifier
5. Characteristics of Photo Diode, Photo Transistor, LDR, LED
6. Series and Parallel Resonant Circuits
7. Silicon Diode as a Temperature Sensor
8. RC Coupled CE amplifier – Two stages with feedback – Frequency response and voltage gain
9. Push-pull amplifier using complementary – symmetry transistors power gain and frequency response.
10. Active filters – low pass and high pass-first and second order frequency response and roll off rate.

TEXT BOOK:

1. Electronics Laboratory Manual, Department of Physics, NITT.

REFERENCE BOOKS

1. B.K. Jones, Electronics for Experimentation and Research, Prentice-Hall (1986).
2. P.B. Zbar, A.P. Malvino and M.A. Miller, Basic Electronics: A Text-Lab Manual, Tata Mc-Graw Hill, New Delhi (1994).

MAJOR ELECTIVE

P18MEPH011	SOLAR PHOTOVOLTAIC TECHNOLOGY						L	T	P	C	
	Total Contact Hours – 60						3	1	0	4	
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To introduce the basic physics and technology of photovoltaic science and systems for solar energy harnessing											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about solar energy and its solar radiation										
CO2	Learn about basic of semiconductor										
CO3	Learn about semiconductor based solar cells										
CO4	Understand the Characterization and Analysis										
CO5	Gain knowledge about designing of solar cells										
CO6	To study and learn about the application of solar photovoltaic technology										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PS O2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval										

Unit – I The Sun Light**12**

World Energy scenario – Advantages and challenges of solar energy harnessing - Source of radiation – solar constant– solar intensity at earth’s surface – direct and diffuse radiation – apparent motion of sun-solar insolation data – solar charts – measurement of diffuse, global and direct solar radiation: pyrheliometer, pyranometer, pyregeometer, net pyradiometer-sunshine recorder.

Unit – II: Semiconductors**12**

Crystals structures, atomic bonding, energy band diagram – direct & indirect band gap – p & n doping and carrier concentration – intrinsic & extrinsic semiconductor – compound semiconductors – diffusion and drift of carriers, continuity equation – optical absorption – carrier recombination – effect of temperature – p-n junction in equilibrium conditions – p-n junction in non-equilibrium condition – p-n junction under illumination

UNIT -III Semiconductors for Solar Cell**12**

Silicon: preparation of metallurgical, electronic and solar grade silicon - *Production of single crystal silicon*: Czokralski (CZ) and Float Zone (FZ) method – imperfections – carrier doping and lifetime – Germanium – compound semiconductors – growth & characterization – amorphous materials – transparent conducting oxides – anti-reflection principles and coatings – organic materials.

UNIT -IV Characterization and Analysis**12**

Device isolation & analysis – ideal cell under illumination – solar cell parameters short circuit current, open circuit voltage, fill factor, efficiency; optical losses, electrical losses, surface recombination velocity, quantum efficiency – measurements of solar cell parameters; I-V curve & L-I-V characteristics, internal quantum yield measurements – effects of series and parallel resistance and temperature.

UNIT -V Design of Solar Cells**12**

Upper limits of solar cell parameters – losses in solar cells – Solar Cell design: Design for High I_{sc} – Design for High V_{oc} – Design for High FF – Si based solar cell Technology: process flow of commercial Si Cell Technologies – high efficiency Si Solar cells. Thin film solar cell technologies: Common features of thin film Technologies – Si technology – CdTe, CIGS, Epitaxial Si. Other technologies: DSSC.

TEXT BOOKS

1. Solar Photovoltaics: Fundamentals, Technologies And Applications 2nd ed., Chetan Singh Solanki, PHI, New Delhi (2011).
2. Semiconductors for solar cells, H. J. Moller, Artech House Inc., MA, USA (1993).
3. Solar Cells: Operating principles, Technology and Systems Applications, Martin Green, UNSW, Australia (1997).

REFERENCE BOOKS

1. Solar Cells and their Applications, Larry D. Partain (ed.), John Wiley and Sons, New York (1995).
2. J. Nelson, The Physics of Solar Cells, Imperial College Press (2006).
3. Photovoltaic Materials, Richard H. Bube, Imperial College Press (1998)

P18MEPH012		FIBER OPTICS							L	T	P	C
		Total Contact Hours – 60							3	1	0	4
		Prerequisite – B.Sc Physics										
		Course Designed by – Department of Physics										
COURSE OBJECTIVES: Fiber optics sensors are widely used and students are exposed to fundamentals, design principles, characteristics and applications of fiber optic sensors.												
COURSE OUTCOMES (COs)												
CO1	Gain knowledge about total internal reflection and refraction											
CO2	Learn about fundamentals of Fiber optic loss and gain.											
CO3	Learn about optical fiber phase interferometers.											
CO4	Learn different polarization modulation sensors.											
CO5	Gain knowledge in Wavelength distribution											
CO6	Understand the total internal reflection and refraction											
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3	
2	CO1	H	H						H			
	CO2	H	H									
	CO3	M	M									
	CO4	M	H									
	CO5	H	H									
	CO6	H	H									
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)		
						✓						
4	Approval	Academic Council Meeting										

Unit – I**12**

Introduction – plane polarized wave – propagation of a light through a quarter wave plate – reflections at a plane interface – Brewster angle – total internal reflection-interference- refraction – concept of coherence – diffraction of Gaussian beam.

UNIT II**12**

Fiber optic fundamentals – numerical aperture – attenuation in optical fibers – pulsed dispersion in step index optical fiber – loss mechanisms – absorptive loss – radiative loss- principle of optical waveguides – characteristics of fibers – pulsed dispersion in planar optical waveguide – modes in planar waveguides – TE,TM modes – propagation characteristics of step index and graded index optical fibers

UNIT III**12**

Intensity-modulated sensors – transmission concept – reflective concept – micro bending concept-intrinsic concepts – transmission and reflection with other optical effects – source of error and compensation schemes – phase modulation mechanisms in optical fibers- optical fiber interferometers – optical fiber phase sensors for mechanical variables – the optical fiber sagnac interferometer – optical fiber interferometric sensors.

UNIT IV**12**

Frequency modulation in optical fiber sensors – introduction – optical fiber Doppler system – development of the basic concepts. Polarization modulation in fiber sensors- introduction – optical activity – Faraday rotation – electro-gyration – electro-optic effect- kerr effect – photoelastic effect – polarization modulation sensors.

UNIT V**12**

Wavelength distribution sensor – introduction – techniques for colour modulation – colour probes – Bragg grating concept – introduction – fabrication – application.

REFERENCE BOOKS

1. Optoelectronics, Endel Uiga, PH, 1995
2. D.A. Krohn, Fiber Optic Sensors: Fundamentals and Applications, 2nd edition, Instrument Society of America (1992).
3. B. Culshaw, Optical Fiber Sensing and Signal Processing, Peter Peregrinus Ltd. (1984).
4. Djafar K.Mynbaev and Lowell L.Scheiner, Fiber-Optic Communications Technology, Peason Education Asia (2001).

P18MEPH013	THIN FILM TECHNOLOGY							L	T	P	C
	Total Contact Hours – 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To cater the post graduate students about fundamental and applications of thin films.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about Preparation of Thin-films										
CO2	Learn about types of nucleation kinetic theory										
CO3	Learn about Characterization of X-ray diffraction , photoluminescence and UV-Vis-IR spectrophotometer										
CO4	Understand the experimental technique for the properties of thin film										
CO5	Gain knowledge about Applications of Optoelectronic devices: LED, LASER and Solar cell										
CO6	To learn about the spectroscopy techniques										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PS O2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

Unit – I: Preparation of Thin-films**12**

Kinetic aspects of gases in a vacuum chamber – classifications of vacuum ranges – production of vacuum – pressure measurement in vacuum systems – thin film (epitaxy) – definition – types of epitaxy. *Different Growth Techniques*: Liquid phase epitaxy, vapour phase epitaxy, molecular beam epitaxy, metal organic vapour phase epitaxy, sputtering (RF & DC), pulsed laser deposition. *Thickness Measurement*: Microbalance technique, photometry, ellipsometry, interferometry.

Unit – II: Kinetics of Thin films**12**

Nucleation Kinetics: types of nucleation – kinetic theory of nucleation – energy formation of a nucleus – critical nucleation parameters; spherical and non-spherical (cap, disc and cubic shaped). *Growth Kinetics*: Kinetics of binary (GaAs, InP, etc.), ternary ($\text{Al}_{1-x}\text{Ga}_x\text{As}$, $\text{Ga}_{1-x}\text{In}_x\text{P}$, $\text{InAs}_{1-x}\text{Px}$, etc.) and quaternary ($\text{Ga}_{1-x}\text{In}_x\text{As}_{1-y}\text{Py}$, etc.) semiconductors – derivation of growth rate and composition expressions.

UNIT III: Characterization**12**

X-ray diffraction – photoluminescence – UV-Vis-IR spectrophotometer – Atomic Force Microscope – Scanning Electron Microscope – Hall effect – Vibrational Sample Magnetometer – Secondary Ion Mass Spectrometry – X-ray Photoemission Spectroscopy.

UNIT IV Properties of Thin films**12**

Dielectric properties – experimental technique for the determination of dielectric properties – optical properties – experimental technique for the determination of optical constants – mechanical properties – experimental technique for the determination of mechanical properties of thin films – magnetic and superconducting properties.

UNIT V Applications**12**

Optoelectronic devices: LED, LASER and Solar cell – Micro Electromechanical Systems (MEMS) – Fabrication of thin film capacitor – application of ferromagnetic thin films; data storage, Giant Magnetoresistance (GMR) – sensors – fabrication and characterization of thin film transistor and FET – quantum dot.

Text Books

1. A. Goswami, Thin Film Fundamentals, New Age international (P) Ltd. Publishers, New Delhi (1996).

Reference Books

1. K.L. Chopra, Thin Film Phenomena, McGraw- Hill book company New York, (1969).
2. Ludminla Eckertova, Physics of Thin Films, Plenum press, New York (1977).
3. Hari Singh Nalwa (ed.), Hand Book of Thin Films, Vol. 1 – 5, Academic Press (2002)

P18MEPH021	CRYSTAL PHYSICS AND X-RAY DIFFRACTION							L	T	P	C
	Total Contact Hours – 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To learn the concept of basics in crystal physics and x-ray diffraction.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about crystal system										
CO2	Learn about production of X-rays										
CO3	Learn about reciprocal lattice vectors and unit cells										
CO4	Understand about the reciprocal lattice vectors and reciprocal lattice vectors										
CO5	Gain knowledge experiment and analysis for an data collection										
CO6	To learn about the structure of solid materials										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT – I GEOMETRY OF CRYSTALS

12

Introduction – lattice – crystal systems – symmetry – primitive and non-primitive cells – lattice directions and planes – unit cells of hcp and ccp structures – constructing crystals – interstitial structures – some simple ionic and covalent structures - Representing crystals in projection – crystal planes – stacking faults and twins – stereographic projection

Unit – II: DIFFRACTION AND X- RAYS

12

Diffraction – Bragg’s law – diffraction methods – scattering by electrons, atoms, unit cell - Introduction to X-rays – electromagnetic radiation – continuous spectrum – characteristic spectrum – absorption – filters – production of X-rays – detection of X-rays – safety precautions – Contributions of Laue, Bragg and Ewald to X-ray diffraction

UNIT III: CRYSTAL SYMMETRY

12

Symmetry of the fourteen Bravais lattices – coordination of Bravais lattice points – space filling polyhedra – thirty two crystal classes – centres and inversion axes of symmetry – crystal symmetry and properties – translation symmetry elements – space groups – Bravais lattices, space groups and crystal structures – Quasiperiodic crystals or crystalloids

UNIT IV LATTICE REPRESENTATIONS

12

Indexing lattice directions – lattice planes – Miller indices – zones – zone axes – zone law – transforming Miller indices and zone axes symbols – reciprocal lattice vectors – reciprocal lattice unit cells – for cubic crystals – proofs of some geometric relationships using reciprocal lattice vectors – Addition rule – reciprocal lattice vectors – d spacing of lattice planes.

UNIT V XRD - EXPERIMENT AND ANALYSIS

12

Powder diffraction geometry - Powder sample preparation and data collection - indexing - peaks-shape profiles and angular dependence - powder-pattern simulation - Rietveld refinement - Single-crystal sample preparation, data collection, data reduction, structure determination and structure refinement

REFERENCES:

1. C. Hammond, The basics of Crystallography and diffraction, Oxford university press, New York (2009).
2. Fundamentals of Powder Diffraction and Structural Characterization of Materials, Peter Y. Zavalij, Maryland, USA
2. B.D. Cullity, Elements of X-ray diffraction, Addison Wesley, Massachusetts (1956).
3. C. Suryanarayana, M.G. Norton, X-ray diffraction – A practical approach, Plenum press, New York (1998).
4. C. Kittel, Introduction to solid state physics, 7th Ed., Wiley India, New Delhi (2004)

P18MEPH022	PHOTONICS							L	T	P	C
	Total Contact Hours – 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
OBJECTIVES: Recall and recount the optical properties of semiconductor light sources and detectors- expand the theory and applications of the confinement of light in waveguides and fibres.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about one, Two- and three-dimensional photonic crystals.										
CO2	Learn about diodes and semiconductor photon sources										
CO3	Learn about Electro-optics of devices										
CO4	Learn about second and Third-order nonlinear optics.										
CO5	Understand about the Ultrafast linear optics Pulse detection										
CO6	To learn about the optical devices and its properties										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT – I PHOTONICS - CRYSTAL AND GUIDED WAVE OPTICS **12**

Optics of dielectric layered media, One-dimensional photonic crystals, Two- and three-dimensional photonic crystals, Planar-mirror waveguides, Planar dielectric waveguides, Two-dimensional waveguides, Photonics-crystal waveguides, Optical coupling waveguides, Sub-wavelength metal waveguides (Plasmonics), Guided rays, Guided waves, Attenuation and dispersion, Holey and photonic-crystal fibres

Unit – II: SEMICONDUCTOR PHOTON SOURCES AND DETECTORS **12**

Light-emitting diodes, Semiconductor optical amplifiers, Laser diodes, Quantum-confined and micro cavity lasers, Photodetectors, Photoconductors, Photodiodes, Avalanche photodiodes, array detectors and noise in photodetectors

UNIT III: ACOUSTO AND ELECTRO OPTICS **12**

Interaction of light and sound-Acousto-optic devices-Acousto-optics of anisotropic media-Principles of electro-optics-Electro-optics of anisotropic media-Electro-optics of liquid crystals-Photo refractivity-Electro absorption

UNIT IV NONLINEAR OPTICS **12**

Nonlinear optical media-Second-order nonlinear optics-Third-order nonlinear optics-Second-order nonlinear optics: coupled wave theory-Third-order nonlinear optics: coupled wave theory-Anisotropic nonlinear media-Dispersive nonlinear media

UNIT V ULTRAFAST OPTICS **12**

Pulse characteristics-Pulse shaping and compression-Pulse propagation in optical fibers-Ultrafast linear optics-Ultrafast nonlinear optics-Pulse detection

REFERENCES:

1. Saleh B E A and M C Teich, “Fundamentals of Photonics”, John Wiley, New York, 1991.
2. Pal B P (Ed.), “Guided Wave Optical Components and Devices”, Academic Press, 2006.
3. Smith F G and T A King., “Optics and Photonics”, John Wiley, Chichester, 2000.
4. Thyagarajan K and A Ghatak, “Nonlinear Optics in Encyclopedia of Modern Optics (Editors: Bob Guenther et al)”, Elsevier Ltd., 2005.

P18MEPH023	MAGNETISM							L	T	P	C
	Total Contact Hours – 60							3	1	0	4
	Prerequisite – B.Sc Physics										
	Course Designed by – Department of Physics										
COURSE OBJECTIVES: To learn the concept of basics in crystal physics and x-ray diffraction											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge about Magnetic material										
CO2	Learn about magnetism										
CO3	Learn about thin film and multilayer										
CO4	Understand about manufacturing magnetic material										
CO5	Gain knowledge about different types magnetic material										
CO6	To remember the different types of magnetism and its properties										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O2
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT – I INTRODUCTION TO MAGNETISM 12

Basic terms and units, Origin of magnetic moment and dipole, Classification of magnetic materials, Magnetism in atoms, Atomic diamagnetism, Atomic paramagnetism, Hund's rule

Unit – II: SOLID STATE MAGNETISM 12

Model of Free Electrons, Pauli Paramagnetism, Spontaneously spin split states, magnetism of 3d Transition Metals and Alloys. Transport in magnetic materials: Magnetotransport in metals, Anisotropic magnetoresistance, Giant magnetoresistance, Colossal Magnetoresistance

UNIT III: MAGNETIC INTERACTIONS 12

Direct exchange, Indirect exchange. Collective Magnetism: Ferromagnetism, Antiferromagnetism, Ferrimagnetisms, Helical Order, Spin Glasses

UNIT IV BROKEN SYMMETRY 12

Different models of magnetic behavior, phase transition and magnetic excitations. Magnetic anisotropies and induced magnetic anisotropy. Low dimensional Magnetism: Magnetic nanoparticles, Superparamagnetism, Magnetic nano wires, Thin films and multilayer

UNIT V MAGNETIC MEASUREMENTS 12

Measurement of susceptibility, Magnetization measurement, Vibrating Sample Magnetometer, SQUID Magnetometer, Magneto-Optic-Kerr effect

TEXT BOOKS:

1. Magnetism in Condensed Matter, Stephen Blundell, Oxford University, 2001
2. Fundamentals of Magnetism, Mathias Getzlaff, Springer-Verlag Berlin Heidelberg, 2008
3. Magnetism and Magnetic Materials, J. M. D. Coey, Cambridge University Press, 2009

REFERENCE BOOKS:

1. Introduction To Magnetic Materials, B. D. Cullity and C. D. Graham, John Wiley & Sons, Inc., Hoboken, New Jersey, 2009.
2. Magnetism: Materials and Applications, Edited by Etienne du TREMOLET de LACHEISSERIE, Damien GIGNOUX, Michel SCHLENKER, Springer, 2008.
3. Theory of Magnetism by Yoshida, Springer

P18MCPH301		SOLID STATE PHYSICS						L	T	P	C
		Total Contact Hours - 60						3	1	0	4
		Prerequisite course – B.Sc Physics									
		Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics									
COURSE OBJECTIVES:- Students will have an appreciation on the physics and properties of different types of materials such as conductors, semiconductors, dielectric, magnetic and superconducting.											
COURSE OUTCOMES (COs)											
CO1	Understand the mechanical properties of solid matter and connect these to bond type and classify solid state matter according to their band gaps										
CO2	Explain how diffraction of electromagnetic waves on solid matter can be used to obtain lattice structure with they conduct current with appreciate how electrons and holes behave in semiconductors, and explain how they conduct current										
CO3	Explain how a lattice vibrates at finite temperature, and how these vibrations determine the heat capacity and conduction										
CO4	Understand the basic physics behind dia, para and ferromagnetism and Explain simple theories for conduction of heat and electrical current in metals										
CO5	Know what superconductivity is and qualitatively relate it to lattice vibrations and the density of state.										
CO6	To understand the fundamentals and concepts in solid state physics in the modern society										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I INTRODUCTION SOLIDS

12

Introduction Solids – crystalline and amorphous – crystal structure and symmetries – reciprocal lattice – defects and dislocations – Brillouine Zone – *types of bonds*: vander Waals, covalent, ionic and metallic – atomic scattering factor – geometric structure factor – electrons in a periodic potential – X-ray diffraction – liquid crystals.

Unit – II: Conductors, Semiconductors and Dielectrics

12

Conductors: Free electron theory – classical and quantum theory, band theory of solids – effective mass of electron – Kronig-Penney model – Bloch theorem – Hall effect – thermopower. *Semiconductors*: Types – carrier and Fermi level statistics for intrinsic and extrinsic semiconductors – electrical conductivity. *Dielectrics*: Types of polarization – frequency dependence of polarization – local electric field – dielectric constant and polarizability – Clausius-Mossotti equation, piezo and ferroelectricity.

Unit – III: Transport and Thermodynamic Studies

12

Lattice vibrations – concept and momentum of phonons – vibrations of mono and di-atomic lattices, heat capacity – Einstein and Debye models - Dulong and Petit's law – Weidemann-Franz law – electronic heat capacity – experimental heat capacity of metals – resistivity – residual resistivity ratio – experimental electrical resistivity of metals – Matthiessen's rule – Magnetoresistance – Giant and colossal magnetoresistance.

Unit – IV: Magnetism

12

Magnetic terminologies – types of magnetism – dia, para, ferro, ferri and anti-ferromagnetism – Hund's rules – Curie-Weiss law – Langevin's classical and quantum theories of dia and para magnetism – Weiss theory of ferromagnetism – Heisenberg model of exchange interaction – concept of domain and hysteresis – antiferro and ferrimagnetism – theories.

Unit – V: Superconductivity

12

Superconductivity – Meissner and isotope effect – thermodynamical and optical properties – supercurrents and penetration depth – London's equations – BCS model conventional – unconventional – critical field – types of superconductors – metal-to-insulator transition – flux quantization – vortex lattice – high T_c superconductors – Josephson Junctions – AC and DC – superfluidity

TEXT BOOKS

1. Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition, (1983).
2. T.H.K. Barron and G.K. White, Heat capacity and Thermal Expansion at Low Temperatures, Kluwer Academic/Plenum Publishers, New York (1999).
3. N.W. Ashcroft and N.D. Mermin, Solid State Physics, Cengage Learning (2010).
4. Ali Omar, Elementary Solid State Physics, Pearson Education India (1999).
5. J.S. Blakemore, Solid State Physics, 2nd edition, Cambridge University Press (1974).

REFERENCE BOOKS

1. B.S. Saxena, R.C. Gupta, P.N.Saxena, Fundamentals of solid state physics, PragatiPrakashan, 7th edition (1999).
2. A.J. Dekker, Solid State Physics, Prentice Hall of India (1971).
3. Helmut Kronmüller, Stuart Parkin, Handbook of Magnetism and Advanced Magnetic Materials, Wiley (2007)
4. Laurent-Patrick Lévy. Magnetism and superconductivity , Springer (2000).

P18MCPH302	ATOMIC AND MOLECULAR SPECTROSCOPY						L	T	P	C	
	Total Contact Hours - 60						3	1	0	4	
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- Students will have an appreciation on the physics and properties of different types of materials such as structure of atoms and molecules .											
COURSE OUTCOMES (COs)											
CO1	Understand basics of atomic and molecular physics making possible to use them for diagnostics of plasmas by means of optical spectroscopy.										
CO2	Understand and study about the basic principle of the spectroscopy										
CO3	Understand and learn about the electronic energy of diatomic molecules - symmetry properties of molecular orbital's.										
CO4	Explain the advantages of Fourier Transform infrared spectroscopy over conventional infrared spectroscopy and how to determine whether the molecular vibrations of a tri-atomic molecule are Raman spectroscopy.										
CO5	Analyze an obtain practical experiences at laboratory measurements of typical spectra as well as at solutions of typical problems from atomic and molecular spectroscopy.										
CO6	To learn about the general structure of diatomic molecules, electronic states, vibrational and rotational energy of diatomic molecules with polyatomic molecules Molecular spectra										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I ATOMIC SPECTRA

12

Quantum states of electron in atoms – hydrogen atom spectrum – electron spin – Stern Gerlach Experiment – spin-orbit interaction – Lande interval rule – two electron systems – LS-JJ coupling schemes – fine structure – spectroscopic terms and selection rules – hyperfine structure – exchange symmetry of wave function – Pauli's exclusion principle – periodic table.

UNIT – II ATOMS IN EXTERNAL FIELDS AND RESONANCE SPECTROSCOPY

12

Zeeman and Paschen Back Effect of one and two electron systems – selection rules – Stark effect – inner shell vacancy – X-ray – Auger transitions – Compton Effect – NMR – basic principles – classical and quantum mechanical description – spin-spin and spin-lattice relaxation times – magnetic dipole coupling – chemical shift – Knight shift – ESR – basic principles – nuclear interaction and hyperfine structure – g-factor – zero field splitting.

UNIT – III MICROWAVE SPECTROSCOPY AND IR SPECTROSCOPY

12

Rotational spectra of diatomic molecules – rigid rotator – effect of isotropic substitution – non-rigid rotator – rotation spectra of polyatomic molecules – linear, symmetric top and asymmetric top molecules – experimental techniques – diatomic vibrating rotator – linear, symmetric top molecule – analysis by infrared techniques – characteristic and group frequencies

UNIT – IV RAMAN SPECTROSCOPY

12

Raman effect – quantum theory of Raman effect – rotational Raman spectra – vibrational Raman spectra – Raman spectra of polyatomic molecules – Raman spectrometer – hyper- Raman effect – experimental techniques.

UNIT – V ELECTRONIC SPECTROSCOPY

12

Electronic spectra of diatomic molecules – Frank-Condon principle – dissociation energy and dissociation products – rotational fine structure of electronic vibration transitions – Fortrat Diagram – predissociation.

TEXT BOOKS

1. C.N. Banwell, Fundamentals of Molecular Spectroscopy, 4th edition, McGraw-Hill, New York (2004).
2. G. Aruldas, Molecular Structure and Spectroscopy, Prentice Hall of India, New Delhi (2002).

REFERENCE BOOKS

1. Manas Chanda, Atomic Structure and Chemical Bond, Tata McGraw-Hill, New Delhi (2003).
2. Arthur Beiser, Concepts of Modern Physics, 6th edition, Tata McGraw-Hill, New Delhi (2003).
3. B.P. Straughan & S. Walker, Spectroscopy: Vol. I, Chapman and Hall (1976).
4. G.M Barrow, Introduction to Molecular Spectroscopy, McGraw Hill (1986).

P18MCPH303		NUCLEAR AND PARTICLE PHYSICS						L	T	P	C
		Total Contact Hours - 60						3	1	0	4
		Prerequisite course – B.Sc Physics									
		Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics									
COURSE OBJECTIVES:- To about the fundamentals of nuclear and particle physics and understand the applications of nuclear and particle physics..											
COURSE OUTCOMES (COs)											
CO1	Understand the fundamental of nuclear and particle physics and how forces arise from virtual particle exchange										
CO2	Understand the structure of nuclei, and simple nuclear models such as the liquid drop model and the shell model and how to use the techniques in scattering theory which are relevant in nuclear physics and partial waves										
CO3	Understand and how to determine which hadron decays would or would not be consistent with the quark content of the Standard Model, with parity violation/conservation, with energy-momentum conservation, etc.										
CO4	Demonstrate a knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of radiation and matter										
CO5	Analyze the key features of nuclear fission and fusion and their applications										
CO6	Understand the main types of nuclear decays, and with models for calculating these and the associated selection rules;										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I NUCLEAR PROPERTIES AND FORCES

12

Nuclear radius and charge distribution – angular momentum – parity – electromagnetic moments-isospin – binding energy – nature of the nuclear force – Yukawa’s hypothesis – Deuteron and its properties – properties of nuclear forces – spin dependence – internucleon potential – charge independence and charge symmetry-polarization

UNIT – II NUCLEAR MODELS

12

Liquid drop model – semi empirical mass formula – shell model – experimental evidence – magic numbers – spin-orbit coupling – angular momentum of the energy states – magnetic moments and Schmidt lines – electric quadrupole moments – excited states – collective model – nuclear vibration and rotation.

UNIT – III RADIOACTIVITY

12

Measurements of lifetimes – multipole moments – theoretical prediction of decay constants – selection rules – angular correlations – internal conversion – Geiger-Nuttal law – barrier penetrations applied to alpha decay and beta decay – simple theory – Kurie plots – comparative half life – selection rules – internal conversion

UNIT – IV NUCLEAR REACTIONS

12

Reaction dynamics – Q-equation – theory of nuclear reaction – reaction cross sections- Rutherford cross section – compound nucleus reactions– direct reactions – resonance reaction – fission process – energy in fission and absorption cross section – neutron sources–fusion fundamentals – Lawson criterion – solar fusion.

UNIT – V ELEMENTARY PARTICLES

12

Classification of elementary particles – types of interactions – conservation laws –momentum-parity and spin – isospin – baryon and lepton numbers – Gell-Mann-Nishijima relationship – mesons and baryons – CPT invariance – detection and properties of neutrino – concept of antiparticles – tau-theta puzzle – neutral kaon – quark model.

TEXT BOOKS

1. Nuclear Physics, D. C. Tyal, Himalaya Publishing House
2. Nuclear Structure, vol.I and Vol.IIA. Bohr and B. R. Mottelson, Benjamin, Reading, MA
3. Kenneth S. Krane, Introductory Nuclear Physics, John Wiley & Sons, New York (1988).
4. D. Griffiths, Introduction to Elementary Particles, Harper and Row, New York (1987).

REFERENCE BOOKS

1. B. L. Cohen, Concepts of Nuclear Physics, Mc-Graw Hill, New York (1971).
2. I. Kaplan, Nuclear Physics, Addison-Wesley, London (1977).
3. D. H. Perkins, Particle Astrophysics, Oxford University Press, New York (2003)
4. Samuel S. M. Wong, Introductory Nuclear Physics, Wiley, Weinheim (2004).

		NUMERICAL METHODS IN 'C' PROGRAMMING					L	T	P	C	
P18MCPH304		Total Contact Hours - 60					3	1	0	4	
		Prerequisite course – B.Sc Physics									
		Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics									
COURSE OBJECTIVES:- To introduce various numerical and computational techniques useful to handle complex problems.											
COURSE OUTCOMES (COs)											
CO1	Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems										
CO2	Understand and derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations										
CO3	Understand and how apply numerical methods to obtain approximate solutions to mathematical problems										
CO4	Understand and study about the concept of mathematics i.d. linear algebra equations										
CO5	Analyze and How to use numerical methods for solving a problem and locate and use good mathematical software.										
CO6	To learn about the main types of Roots equation, ordinary differential and linear algebra, advanced method of numerical method in programming										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I ROOTS OF EQUATIONS**12**

Bracketing and bisection – false position method – Newton-Raphson method – iteration methods – acceleration of convergence – polynomial equations – complex roots and Muller method-parallel computing program

UNIT – II INTERPOLATION AND INTEGRATION**12**

Introduction – Lagrange and Newton interpolations – least square fitting – rational approximation – numerical differentiation – numerical integration – trapezoidal rule, Simpson's rule.

UNIT – III LINEAR ALGEBRA**12**

System of linear equations – Gauss elimination method – pivoting method – triangularization (LU) method – eigenvalues and eigenvectors – Jacobi method for symmetric matrix – Rutishauser LU method for arbitrary matrices

UNIT – IV ORDINARY DIFFERENTIAL EQUATIONS**12**

Single step methods – Runge-Kutta (fourth order) methods: fixed and controlled step size – Predictor-Corrector method – system of first order ODEs – finite difference method – finite element method.

UNIT – V ADVANCED METHODS**12**

Introduction to parallel computing – numerical operations in parallel computing – roots of an equation – interpolation and integration – system of linear equations – artificial neural network – learning

TEXT BOOKS

1. Samuel D. Conte and Carl de Boor, Elementary Numerical Analysis, 3rd edition, Tata McGraw-Hill (2010).
2. M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International (1993).
3. Srimantha Pal, Numerical Methods, Oxford University Press (2009).

REFERENCE BOOKS

1. W.H. Press, S.A. Teukolsky, W.T. Vetterling and B.P. Flannery, Numerical Recipes in C: The Art of Scientific Computing, Cambridge University Press (1992).

P18MCPH3L1	GENERAL PHYSICS LABORATORY - III						L	T	P	C	
	Total Contact Hours - 48						1	0	3	4	
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- To introduce the basic concepts of various advanced experimental techniques used in research through hands on experience and the basic principles, instrumentation and applications of analytical technique.											
COURSE OUTCOMES (COs)											
CO1	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.										
CO2	To understand the knowledge in the scientific methods and learn the process of measuring different Physical variables										
CO3	Understand and Development skills in arranging and handling different measuring instruments										
CO4	Analyze the experimental errors in various physical measurements and to plan / suggest on how the contributions could be made of the same order, so as to minimize the errors										
CO5	Explain the Principles of digital electronics and various communication systems										
CO6	To understand knowledge about the fundamentals of electronic components, devices, transducers										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

LIST OF EXPERIMENTS

1. X-Ray Diffraction – Determination of lattice parameters of a crystalline solid
2. UV-Vis Spectrophotometer – Determination of absorption coefficient and bandgap
3. FTIR Spectrometer – Determination of vibration levels in a compound
4. Superconductivity – Determination of transition temperature
5. Contact Angle Measurement
6. G.M. Counter
7. Thin Film Deposition and Measurement of Electrical Conductivity – Four Probe Method
8. Ellipsometer – Determination of n and k of a material

TEXT BOOKS

1. Physics practical manual , Department of physics,

REFERENCE BOOKS

1. L.A. Leventhal, Micro Computer Experimentation with the Intel SDK-85 (1980).
2. Learning MATLAB – The MathWorks, Inc (1999).
3. Kenneth L. Ashley, Analog Electronics with LabVIEW, Pearson Education (2003)

P18MCPH3L2	ELECTRONICS LABORATORY -III							L	T	P	C
	Total Contact Hours - 48							1	0	3	4
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- To understand the digital electronics circuits and how to write the programme addressing modes & instruction set of microprocessor etc.,											
COURSE OUTCOMES (COs)											
CO1	Explain the working of different types of feedback amplifiers & oscillators										
CO2	How to write the Mathematical operations using MATLAB program										
CO3	Knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.										
CO4	To learn about the Electronic circuit using microprocessor and to study the working process of , OP-amp, special diodes										
CO5	An ability to use the techniques, skills, and modern science and technology tools necessary for science and engineering technology practice										
CO6	To understand knowledge about the fundamentals of electronic components, devices, transducers										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

LIST OF EXPERIMENTS

1. MATLAB-1: Matrix operations
2. MATLAB-2: Digital Signal Processing
3. MATLAB-3: Solving Ordinary Differential Equations
4. Microprocessor-1: Stepper Motor Interface
5. Microprocessor-2: Traffic Control
6. Microprocessor-3: Interfacing Display
7. Microprocessor-4: Interfacing with Voltmeter
8. Labview-1: Operational Amplifier Circuits
9. Labview-2: Simulation of Diode characteristics
10. Labview-3: Design of Op-Amp AC Characteristics
11. Labview-4: Construction of OPAMP
12. Labview-5: Design of 555 Timer Chip Astable Circuit

TEXT BOOKS

1. Kenneth L. Ashley, Analog Electronics with LabVIEW, Pearson Education (2003)

REFERENCE BOOKS

1. L.A. Leventhal, Micro Computer Experimentation with the Intel SDK-85 (1980).
2. Learning MATLAB – The MathWorks, Inc (1999).

P18MCPH401	ELECTRONICS							L	T	P	C
	Total Contact Hours - 60							3	2	0	4
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- To impart a diversified knowledge on circuit analysis, the semiconductor devices, FETs, operational amplifiers and digital circuits and their applications											
COURSE OUTCOMES (COs)											
CO1	Execute the basic concept of electronics circuit using op-amp, oscillator and digital circuits										
CO2	Understand the operational characteristics of Semiconductor devices.										
CO3	Understand the basic model of BJT and FET.										
CO4	Explain the working of different types of feedback amplifiers & oscillators.										
CO5	An ability to identify, formulate, and solve complex engineering problems by applying principles of science, and mathematic										
CO6	An ability to develop and conduct appropriate experimentation, analyze and interpret data to draw the circuits										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I SEMICONDUCTOR AND SPECIAL DIODES

12

Introduction to semiconductor - Bandgap - forbidden energy gap - valence and conduction bands- types of semiconductor - energy band diagram and fermi level - PN junction barrier voltage across the junction. Schottky barrier diode – varactor diode-photodiode – solar cell – photodiodes and transistors – light emitting diode – semiconductor laser – UJT – opto-couplers

UNIT – II BIPOLAR TRANSISTOR AMPLIFIERS AND FETS

12

Biassing characteristics of junction transistors – analysis using re model-fixed bias-voltage divider bias-emitter bias – direct coupled transistor amplifiers – single stage transistor amplifier – frequency response – feed back in amplifiers – effect of negative feedback in amplifiers – FETs – different types-low and high frequency FETs, frequency response of FET – applications

UNIT-III OSCILLATORS

12

Oscillator principle – oscillator types – frequency stability, RC oscillators – phase shift oscillator – Wein bridge oscillator – LC tunable oscillators – limitations – multivibrators – monostable and astable – 555 IC timer – sine wave and triangular wave generation – crystal oscillators and their applications.

UNIT – IV OPERATIONAL AMPLIFIERS

12

Basis of operational amplifier – characteristics – CMRR – inverting and non-inverting modes- sum and difference amplifiers – integrating and differentiating circuits – feedback types – current to voltage (ICVS) and voltage to current (VCIS) conversion — op-amp application – instrumentation amplifiers – low pass and high pass active filters.

UNIT – V DIGITAL CIRCUITS

12

Logic gates: De Morgan's law, binary adder, comparators, decoders, multiplexers. *Flip-flops:* RS flip-flop, JK flip- flop, JK master-slave flip-flops, T flip-flop, D flip-flop. Shift registers – synchronous and asynchronous counters – registers – A/D and D/A conversion.

TEXT BOOKS

1. J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
2. Albert Malvino, David J Bates, Electronics Principles, Tata McGraw-Hill (2007).
3. R.J. Higgins, Electronics with Digital and Analogue Integrated Circuits, Prentice Hall (1983).

REFERENCE BOOKS

1. R. L. Boylsted and L. Nashelsky, Electronic Device and Circuits, Pearson Education (2003).
2. C.L Wadhwa, Network Analysis and Synthesis, New Age International Publishers, (2007).
3. G.B. Calyton, Operation Amplifiers, ELBS (1980).

P18MCPH402	MICROCONTROLLER AND INSTRUMENTATION						L	T	P	C	
	Total Contact Hours - 60						3	2	0	4	
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- Students will study the major characteristics of measurement systems and errors involved in them and understanding related to production and measurement of low temperatures and high pressure with read various spectroscopic techniques and detectors. To study the Architecture of 8085 & 8051 and study the addressing modes & instruction set of 8085 & 8051.											
COURSE OUTCOMES (COs)											
CO1	Study different methods available for measurement of passive elements like resistance, inductance & capacitance and solving problems										
CO2	An ability to use the techniques, skills, and modern science and technology tools necessary for science and engineering technology practice.										
CO3	knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.										
CO4	Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.										
CO5	Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.										
CO6	An ability to develop analyze and interpret data to draw the circuits										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO1	PSO2
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg. Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I GENERALIZED CHARACTERISTICS OF INSTRUMENTS 12

Static characteristics: accuracy, precision, repeatability, reproducibility, resolution, sensitivity, linearity, drift, span, range. Dynamic characteristics: transfer function, zero order instruments, and first order instruments – step, ramp, frequency responses – second order instruments – step-ramp response – dead time elements. Types of Errors: gross, systematic, random.

UNIT – II THERMAL SYSTEMS 12

Temperature scales – liquefaction of gases, achieving low temperature – design of cryostats. High temperature furnaces: resistance, induction and arc furnaces – high temperature measurements – pyrometers – total and selective radiation pyrometers – optical pyrometer.

UNIT – III DETECTORS AND SPECTROSCOPY 12

Detectors: pyroelectric, thermoelectric, photoconducting, photoelectric, photomultiplier, scintillation types of detectors, photon counters. Spectroscopy: principles of atomic absorption spectroscopy – instrumentation – single and double beam spectrometers –theory and components of nuclear quadrupole resonance technique – applications

UNIT - IV ARCHITECTURE OF MICROCONTROLLER 8051 12

Introduction –comparison between microprocessor and microcontroller-architecture of 8051-key features of 8051- memory organization- data and program memory-internal RAM organization-special function registers-control registers-I/O port-counters and timers- interrupt structures.

UNIT –V PROGRAMMING THE MICROCONTROLLER 8051 12

Instruction set of 8051-arithmetic, logical, data, movable, jump and call instructions-addressing modes-immediate, register, direct and indirect addressing modes-assembly language programming-simple program to illustrate arithmetic and logical operations –sum of numbers, biggest and smallest numbers in an array- software time delay system.

TEXT BOOKS

1. A.K. Sawhney and PuneetSawhney, A Course in Mechanical Measurement and Instrumentation, DhanpatRai&Sons, New Delhi 2000.
2. Dennis Roddy and John Coolen, Electronic communication, 4th edition, PHI private Ltd., (1999). (Unit – II)
3. C.S. Rangan, G.R. Sharma and V.S.V. Mani, Instrumentation Devices and Systems, Tata McGraw-Hill (1983).
4. H.H. Willard, L.L. Merrit and John A. Dean, Instrumental Methods of Analysis, 6th edition, CBS Publishers & Distributors (1986).

REFERENCE BOOKS

- 1 . D.V.S. Murty, Transducers and Instrumentation, Prentice – Hall of India (P) Ltd., New Delhi (1995).

2. Ernest O. Doebelin, Measurement System Applications and Design, McGraw Hill International Book Company, Singapore (1983). 3.
3. Ramesh S Goankar, Micro processor Architecture, Programming & Applications with the 8085, Penram International Publishing (India) Pvt. Ltd., Fourth Edition, 2002
4. . Kenneth J. Ayala, The 8051 Microcontroller, Edition3 ,PublisherCengage Learning, 2004
5. Mazidi,The 8051 Microcontroller And Embedded Systems ,2 ndEdition, PublisherPearson Education India, 2007

MAJOR ELECTIVE

P18MEPH031	NANOSCIENCE AND NANOTECHNOLOGY							L	T	P	C
	Total Contact Hours - 60							3	1	0	4
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- To impart the basic knowledge on nanoscience and technology which includes the exotic properties of materials at nanoscale, various techniques available for the processing and characterization of nanostructured materials, applications in selected fields such as magnetic recording technology, electronics and biomedical field.											
COURSE OUTCOMES (COs)											
CO1	Demonstrate knowledge on the physics, chemistry, biology, quantum confinement and photonics of nanomaterials										
CO2	Demonstrate an ability to synthesis and characterize the nanomaterials.										
CO3	Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks including nanometrology, material science, physics, chemistry and nanobiotechnology.										
CO4	Demonstrate their skills for synthesis, processing and handle imaging equipments to analyze nanomaterials.										
CO5	Understanding of impact of nanomaterials on the society including environment, health and ecosystem.										
CO6	To study and execute the application nanotechnology										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg. Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I NANOMATERIALS AND STRUCTURES **12**

Nanomaterials – types: nanowires, nanotubes, fullerenes, quantum dots, Dendrimers, nanocomposites– properties – Methods of preparation: top-down, bottom-up.

UNIT – II CHARACTERIZATION TOOLS **12**

Electron Microscopy Techniques – SEM, TEM, X ray methods – optical methods – fluorescenceMicroscopy – single molecule surface enhanced resonance – Raman spectroscopy – Atomic ForceMicroscopy – MRI STM and SPM.

UNIT – III NANOMAGNETISM **12**

Mesoscopic magnetism – *magnetic measurements*: miniature Hall detectors, integrated DC SQUID Microsusceptometry – magnetic recording technology, biological magnets.

UNIT – IV NANO ELECTRONICS AND INTEGRATED SYSTEMS **12**

Basics of nanoelectronics – single electron transistor – quantum computation – parallel architecturefor nanosystem – nanolithography – basic and integrated structures – MEMS and NEMS – dynamicsof NEMS – limits of integrated electronics

UNIT – V BIOMEDICAL APPLICATIONS OF NANOTECHNOLOGY **12**

Biological structures and functions – biomolecular motors – drug delivery systems – organic-inorganic nanohybrids – inorganic carriers – nanofluidics.

Text Books

1. Jan Korvink and Andreas Greiner, Semiconductors for Micro and Nanotechnology – an Introduction for Engineers, Weinheim Cambridge: Wiley-VCH (2001).
2. N John Dinardo and Weinheim Cambridge, Nanoscale Characterisation of Surfaces & Interfaces, 2nd edition, Wiley-VCH (2000).
3. Introduction to Nanotechnology, C.P. Poole and F.J. Ownes, Wiley_India (2007).

Reference Books

1. G Timp (ed), Nanotechnology, AIP Press, Springer (1999).
2. M. Wilson, K. Kannangara, G. Smith, M. Simmons and B. Raguse, Nanotechnology: Basic Sciences and Energy Technologies, Overseas Press (2005).
3. Nano: The Essentials, T. Pradeep, Mc-Graw Hill India (2007).

P18MEPH032	LASERS AND APPLICATIONS						L	T	P	C	
	Total Contact Hours - 60						3	1	0	4	
	Prerequisite course – B.Sc Physics										
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics										
COURSE OBJECTIVES:- To introduce basics and usage of laser in science and industry.											
COURSE OUTCOMES (COs)											
CO1	To study the knowledge on basic concept of LASER and its applications										
CO2	Execute the requirements for a system to act as a laser.										
CO3	Differentiate the various types of lasers and their means of excitation										
CO4	Relate the structure and properties of lasers to their performance and intended applications										
CO5	Demonstrate competence in the use of various procedures and instruments for the assembly and characterization of laser systems. And Apply the scientific process in the conduct and reporting of experimental investigations										
CO6	Demonstrate an awareness of the safety responsibilities involved in working with lasers										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO2	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT – I PROPERTIES AND TYPES OF LASERS **12**

Laser Fundamentals: spontaneous and stimulated emission, Einstein coefficients, population inversion – Properties: temporal and spatial coherence, directionality – Types: ruby laser, helium-neon laser, CO₂ laser, dye lasers, semiconductor lasers.

UNIT – II HOLOGRAPHY **12**

Spatial frequency filtering – holography – applications of holography – HNNT (Holographic Non-Destructive Testing) – holographic storage – optical disk storage – laser speckle and speckle meteorology – SNNT (Speckle Non-Destructive Testing).

UNIT – III FIBRE OPTICS **12**

Optical fibre principle – types of fibres – properties – fiber optical communication – fibre amplifiers, fiber-optic sensors: intensity-phase polarization and frequency dependent techniques.

UNIT – IV LASERS IN SCIENCE **12**

Saturation spectroscopy – excited state spectroscopy – nonlinear spectroscopy – time domain and its applications – stimulated Raman emission – laser fusion – isotope separation – medical applications, photo-chemical applications

UNIT – V LASERS IN INDUSTRY **12**

Materials processing – drilling, cutting, welding – alloying – glazing – ablation – laser chemical vapour deposition (LCVD) – laser thermal deposition – hardening, annealing – laser tracking – lidar.

TEXT BOOKS

1. K. Thyagarajan and A.K. Ghatak, Lasers Theory and Applications, Mcmillan (1981).
2. K. Koebner (ed.), Industrial Applications of Lasers, Wiley (1984).

REFERENCE BOOKS

1. J.T. Cuxon and D.E. Parker, Industrial Lasers and their Applications, Prentice Hall (1985).
2. B. Culshaw, Optical Fiber Sensing and Signal Processing, Peter Peregrinus Ltd. (1984).
3. F.C. Appard, Fiber Optics Handbook, McGraw-Hill (1989).

P18MEPH033		ASTRONOMY & ASTROPHYSICS						L	T	P	C
		Total Contact Hours - 60						3	2	0	4
		Prerequisite course – B.Sc Physics									
		Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics									
COURSE OBJECTIVES:- Student will be learn about to Motions in the Sky, Stars: Birth, Life, & Death Galaxies & Black Holes, Cosmology: From the Big Bang to the Present Day											
COURSE OUTCOMES (COs)											
CO1	Learn fundamental concepts in astrophysics that will equip you to better understand new scientific discoveries made in the coming years and decades										
CO2	List astrophysical relevant radiation mechanisms, and identify them										
CO3	Discuss the properties of degenerate matter and the outcome of stellar evolution for stars of different mass										
CO4	Understand astrophysics as a way to describe our real physical world										
CO5	Analyse the techniques and methods used to gain new knowledge in physics and astronomy										
CO6	Understand the concepts in astrophysics and astronomically new scientific discoveries made in futures										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT -I INTRODUCTORY ASTRONOMY

12

History of Astronomy; Overview of the major constituents of the universe; Solar System, Planets - laws of motion of planets, inner planets, outer planets; Extrasolar planets- Methods of detection of extrasolar planets; Black body radiation-specific intensity, luminosity; Basics of radiative transfer-emission coefficient, absorption coefficient, source function

UNIT –II THE HEAVENS ABOVE CELESTIAL SPHERE AND TIME CONSTELLATIONS. 12

The celestial sphere. Coordinate systems: Equatorial, ecliptic system. Seasons, Sidereal, Apparent and Mean solar time. Calendar. Julian date. Stellar Distances and Magnitudes Distance scale in astronomy. Determination of distances to planets and stars. Magnitude scale. Atmospheric extinction. Absolute magnitudes and distance modulus

UNIT –III OUR SOLAR SYSTEM 12

Theories of formation of the Solar System. The Sun Photosphere, chromosphere and corona of the Sun. Sun spots and magnetic fields on the sun. Solar activity, solar wind. Planets and their Satellites Surface features, atmospheres and magnetic fields of Earth, Moon and Planets. Satellites and rings of planets. Asteroids, Meteors, Meteorites and Comets.

UNIT -IV STARS 12

What are they? Stars. Spectral classification. Energy generation in stars. Basics of Star formation & Evolution. The HR diagram. Super dense objects - White dwarfs, Neutron stars & Pulsars. Black holes.

UNIT- V 12

The milky way galaxy & galaxies beyond structure of the milky way galaxy, What are galaxies? Different types of galaxies. Hubble's classification. Structure, size & mass of the Milky Way galaxy. Position of our Sun and its motion around the galactic centre. Cosmology The expanding universe. Cosmological models: Big Bang and Steady State models. Dark matter.

TEXT BOOKS

1. Frank H. Shu: The Physical Universe-An Introduction to Astronomy.
2. K D Abhyankar: Astrophysics of the Solar System.
3. Baidyanath Basu: Introduction to Astrophysics. 7. Jayant Narlikar: Structure of Univer

REFERENCE BOOKS

1. H. Karttunen, P Kroger, H Oja, M Poutanen & K. J. Donner editors. Fundamental Astronomy.
2. W.M.Smart: Foundations of Astronomy.

P18PRPH4P1		PROJECT WORK AND VIAVOCE							L	T	P	C
		Total Contact Hours - 120							0	0	9	9
Prerequisite course – B.Sc Physics												
Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics												
<p>COURSE OBJECTIVES: To guide the students such a way that the they carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations</p> <p>. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization.</p> <p>To simulate real life situations related to the program and impart adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.</p>												
COURSE OUTCOMES (COs)												
CO1	List out the concept and objectives, nature, types and methods of project.											
CO2	To develop a scientific approach in solving problems related to physics											
CO3	To Practice the research design, and methodology											
CO4	To study the characterization and synthesized material											
CO5	Measure the major findings, suggestions and conclusion											
CO6	Design the model for project report.											
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	
2	CO1	H	H						H			
	CO2	H	H									
	CO3	M	M									
	CO4	M	H									
	CO5	H	H									
	CO6	H	H									
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	✓	
4	Approval	Academic Council Meeting										

Topics in Physics will be assigned to each group of students by the staff coordinator guiding the project. The project work is to be carried out at the department or any other organization approved by the staff coordinator and the HoD. Review meeting will be conducted once in a month. Viva Voce presentation will be conducted by the HoD, internal examiner and the staff coordinator guiding the project.

Marks

Dissertation	150
Viva- Voce Examination	50

Course Coordinator**HOD**

P18ACEN001	AUDIT COURSE ENGLISH FOR RESEARCH PAPER WRITING
P18ACCE002	DISASTER MANAGEMENT
P18ACEN003	SANSKRIT FOR TECHNICAL KNOWLEDGE
P18ACBA004	VALUE EDUCATION
P18ACBW005	CONSTITUTION OF INDIA
P18ACBA006	PEDAGOGY STUDIES
P18ACBA007	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
OPEN ELECTIVE	
STRESS MANAGEMENT BY YOGA	
TERM PAPER	

OPEN ELECTIVE – I

P18OEBA001	ADVERTISING AND SALES MANAGEMENT					L	T	P	C			
	Total Contact Hours – 60					4	0	0	4			
	Prerequisite course –UG Level											
	Course Coordinator Name & Department:- T Manjiniprakash/BBA											
COURSE OBJECTIVES: -												
<ul style="list-style-type: none"> ● Identify the terms and concepts that are commonly used in promotion and advertising. ● Demonstrate preparation to comprehend the basic advertising. ● Give the relationship which underlines these terms and concepts To familiarize the students with the basic fundamentals of accounting. ● To impart knowledge on final accounts of sole trading concern. ● To enable the students on the concept of income & expenditure and receipts and payments. 												
COURSE OUTCOMES (COs)												
CO1	Students gain basic knowledge of Advertising its functions, roles and development of advertising.											
CO2	Know about Advertising design and its strategies.											
CO3	Expose on Advertising, media and about its types.											
CO4	To forecast sales and its techniques used in management.											
CO5	Students were enriched about salesmanship, sales planning, budgeting.											
CO6	Develop an advertising plan and present and defend it persuasively.											
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low												
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	PS O2	PS O3	
2	CO1	L	M						M	L		
	CO2	H	L									
	CO3	L	H									
	CO4	H	L									
	CO5	L	M									
	CO6	M	L									

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
							✓		
4	Approval	Academic Council Meeting							

UNIT - I

12

Introduction to Advertising- Definition -Roles of Advertising- Functions of Advertising-Steps in Development of Advertisement

UNIT – II

12

Advertising Design- Appeals- Structure of an Advertisement - Message Strategies - Cognitive strategy- Executional Strategies-Creating Advertising- Advertising Effectiveness.

UNIT–III

12

Advertising Media - Merit and demerits- Kinds of Advertising - Advertising Media- print media - Broadcasting media- Non-media advertising- online advertising.

UNIT – IV

12

Sales Management - Defining - Objectives -Strategies- Sales Executives – Functions -Qualities - Sales Presentation Techniques - Emerging Trends in Sales Management.

UNIT – V

12

Selling Concept - Objectives- scope and techniques of Salesmanship- Sales Planning- Importance – process- Sales Budget- Objectives-uses of sales Budget.

Text book

1. Advertising & promotion: George E.Belch, THM
2. Advertising Management, Dr. Varma&Aggarwal, kingBooks

References:

1. Sales promotion and advertising management by M .N.Mishra. Himalaya Publication.
2. Advertising and sales management by SanjeevChauhan (Astha publication)
3. Anderson, Hair, Bush: Professional Sales Management, McGraw Hill, Singapore.

T ManjiniPrakash

Course Coordinator

HOD

P18OEBA002	BPO MANAGEMENT					L	T	P	C		
	Total Contact Hours – 60					4	0	0	4		
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- .P.Srinivasan/ Business Administration										
COURSE OBJECTIVES: -											
<ul style="list-style-type: none"> To familiarize the students with the basic fundamentals of BPO industry To impart knowledge on BPO industry To enable the students on the concept of various decisions in Business Process Outsourcing 											
COURSE OUTCOMES (COs)											
CO1	Develop a strategic understanding of the concepts of BPO's and its benefits										
CO2	Explaining various models used in functioning of BPO's and Trends.										
CO3	Describe the opportunities and challenges in Human Resources BPO										
CO4	Analyzes about call centers its functions, processes and classifications										
CO5	Developing efficiency in understanding the customers and capabilities in handling calls.										
CO6	To understand the future trends in BPO industry										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS01	PS02	PS03
	CO1	H	M						M	L	
	CO2	H	L								
	CO3	H	M								
	CO4	M	H								
	CO5	M	M								
	CO6	L	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engineering (ES)	Profession	Professional Core	Non-Major	Open Elective (OE)	Any other	Project/Term Paper/Seminar/Internship()
								✓		
4	Approval	Academic Council Meeting								

UNIT – I

Business Process Outsourcing – Meaning – definition - Basics - Benefits - BPO Models - - BPO Companies in India.

12

UNIT-II

Healthcare BPO – Structure of the American Healthcare Sector – Activity Profile –Future Trends and Threats – Case Study – Cbay Systems.

12

UNIT - III

Human Resource BPO – Reasons for outsourcing HR – Activities involved in HR BPO – HR Outsourcing Trends – Career in HR BPO – Emerging BPO Domains – Media and Entertainment BPO – Publishing BPO.

12

UNIT – IV

Call Centres – Functions – Processes – classifications – Telemarketing – Tele selling – Preparing for a Job – Approach – Training – Selection Process.

12

UNIT – V

Improving Efficiency – Handling Calls – Team Player – Pleasing the Customers – Converse efficiently – Reducing stress.

12

TEXT BOOKS:

- 1.BPO Industry in India by S K Awasthi by Jain Book
- 2.Business Process Outsourcing: Its Prospects and Challenges by Barua.

REFERENCE BOOKS

1. SudhindraMokhasi(2009) ,BPO – Sutra : True stories from India’s BPO and call centres, - Rupa& Co.
2. Kulkarni, Sarika.(2005), Business process outsourcing – Delhi, Jaico Publishing House.
3. Shikapur, Deepak(2004), BPO Digest. Ameya Inspiring Books.

Mr.P.Srinivasan

Course Coordinator

HOD

P18OEBA003	CALL CENTER MANAGEMENT-Voice and Non Voice	L	T	P	C
	Total Contact Hours –60	4	0	0	4
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:-A.Jhoncy / BBA				

COURSE OBJECTIVES:-

- Develop and motivate a call centre team.
- Get the most out of call monitoring technology and prepare effective management reports.
- React to and plan for operational bottlenecks.
- Give meaningful feedback to call-centre agents and set achievable goals and targets.
- Students will learn about the roles and methods of different kinds of call centers. They will apply this by designing their own call center and trying to anticipate customer needs.

COURSE OUTCOMES (COs)

CO1	Gaining a basic knowledge about call centers its functioning and classifications.
CO2	To know about handling the Issues and problems related to calls in a efficient manner.
CO3	Gives knowledge of technical communications, speech process and educate conversation of oral skills.
CO4	Students acquire knowledge towards pre-interview about Interview questions and answering techniques
CO5	Analyses fully about the medias of communications.
CO6	Demonstrate awareness of the pragmatics of call center planning and operation

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	PS O2	PS O3
	CO1	M	H						M	H	
	CO2	M	H								
	CO3	L	H								
	CO4	L	H								
	CO5	M	H								
	CO6	L	H								

	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg sciences (ES)	Professiona	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship(PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT – I

12

Call centers – Meaning – Functions – Processes - Classifications – Tele selling – Types of call centers.

UNIT – II

12

Improving Efficiency – Handling calls – Team Players – Components and working of call center – Issues and problems.

UNIT – III

12

Nature of Technical communication: Stages of communication – Nature of Technical Communication - The speech process – Conversation and Oral skills.

UNIT – IV

12

Job Interview: Pre – Interview preparation techniques – Interview questions – Answering Strategies – Frequently asked Interview questions.

UNIT – V

12

Communication media – Telephone – Fax – Internet – Email – Video conferencing.

TEXT BOOKS

1. Brad Cleveland - Call Center Management on Fast Forward: Succeeding in the New Era of Customer Relationships (3rd Edition) Third Edition,
2. Mr. Thomas Anthony Laird - Advice from a Call Center Geek: Rethinking Call Center Operations,

REFERENCE BOOKS

1. W. Stallings “Data and Computer Communication” Pearson Education, 5 Edition, 2001.
2. M. AshrajRizvi,” Effective Technical Communication”, Tata McGraw – Hill Education, 2005.
3. R.S.N.Pillai&Bagavathi – Modern commercial correspondence.

A.Jhoney

Course Coordinator

HOD

P18OEBA004	CUSTOMER RELATIONSHIP MANAGEMENT						L	T	P	C	
	Total Contact Hours – 60						4	0	0	4	
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- Dr.D Arun Kumar /BBA										
COURSE OBJECTIVES: -											
<ul style="list-style-type: none"> To Popularize the students with the basic fundamentals of CRM. To improve knowledge & skills on Customer relationship of Marketing strategy. To develop the students on the concept of Customer service. 											
COURSE OUTCOMES (COs)											
CO1	To popularize with the basics of CRM.										
CO2	Can increase awareness about Customer relationship.										
CO3	Able to be aware of the concept of Customer service.										
CO4	Can respond to the concept of Customer needs.										
CO5	Develop confidence in the practical aspects of Customer Satisfaction										
CO6	Identify the main Customer Expectations.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PS O1	PS O2	PS O3
2	CO1	M	L						M	L	
	CO2	L	L								
	CO3	M	L								
	CO4	L	L								
	CO5	M	H								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)		Basic Sciences (BS)	Engg Sciences (ES)	Professional	Core Elective (CE)		Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/Seminar/ Internship(PR)
									✓		
4	Approval	Academic Council Meeting									

UNIT – I **12**

CRM – Introduction – Definition – Need for CRM – Customer satisfaction – Customer loyalty – Product Marketing – Direct Marketing-

UNIT – II **12**

Customer learning relationship – Key stages of CRM - Force driving CRM – Benefits of CRM – Growth of CRM Market in India – Key principles of CRM.

UNIT – III **12**

CRM – Program – Ground work for effective use of CRM – Components of CRM – Types of CRM.

UNIT - IV **12**

CRM Process - Frame work – Governance process- Performance evaluation process.

UNIT–V **12**

Use of Technology in CRM – Call center process – CRM Technology tools – Implementation – Requirements analysis – selection of CRM Package – reasons and failure of CRM.

TEXT BOOK

1. Kristin Anderson & Carol Kerr – Customer Relationship Management – McGrawHill 2002
2. Sheth – Customer Relationship Management – McGraw Hill Edition 1st Edition 2000

REFERENCE BOOK

1. Dr. P .Sheela Rani – Customer Relationship Management – Margham Publication.
2. K. Balasubramaniam – Customer Relationship Management – GIGO Publication, 2005.
3. Dr. Ravi Kalakota E – business – Road map for success, Pearson education Asia, 2000.

Dr.D.ArunKumar

Course Coordinator

HOD

P18OEBA005	ENTREPRENEURSHIP DEVELOPMENT					L	T	P	C		
	Total Contact Hours – 60					4	0	0	4		
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- Dr.DArun Kumar /BBA										
COURSE OBJECTIVES: -											
<ul style="list-style-type: none"> To make publicity on the students with the basic fundamentals of Entrepreneur Development To improve knowledge & skills on Entrepreneurship. To develop the students on the concept of Entrepreneurial skills. 											
COURSE OUTCOMES (COs)											
CO1	To popularize with the basics of Entrepreneur development.										
CO2	Can increase awareness about Entrepreneurship.										
CO3	Able to be aware of the concept of Entrepreneurial skills.										
CO4	Can respond to the concept of Entrepreneurial knowledge.										
CO5	Develop confidence in the practical aspects of Business Opportunity.										
CO6	Identify the main Innovations in Entrepreneurial Development.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO 2	PO3	PO4	PO5	PO6	PO 7	PS O1	PS O2	PS O3
2	CO1	L	L						M	L	
	CO2	L	M								
	CO3	L	L								
	CO4	L	L								
	CO5	L	L								
	CO6	L	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship(PR)			
							✓				
4	Approval	Academic Council Meeting									

UNIT – I **12**

Introduction to Entrepreneurship: Meaning and concept of entrepreneurship - the history of entrepreneurship development - role of entrepreneurship in economic development

UNIT – II **12**

The Entrepreneur: Meaning of entrepreneur - the skills required to be an entrepreneur, and role models, mentors and support system.

UNIT – III **12**

Business Opportunity Identification: Business ideas, methods of generating ideas - legal form of new venture, protection of intellectual property -marketing the new venture.

UNIT – IV **12**

Preparing a Business Plan: Meaning - significance of a business plan - components - feasibility study.

UNIT – V **12**

Financing the New Venture: Importance - types of ownership securities - venture capital - types of debt securities -determining ideal debt-equity mix - financial institutions and banks.

TEXT BOOK

1. Robert D. Hisrich, Mathew J Manimala, Michael P Peters, Dean A Shepherd, “Entrepreneurship”, 9e,McGraw Hill Education, 2014.
2. Peter F. Drucker, “Innovation and Entrepreneurship”,Harper Collins, 2009.

REFERENCE BOOK

1. John Bessant, Joe Tidd, “Innovation and Entrepreneurship”,2e,Wiley India Private Limited, 2012.
2. Robin Lowe, Sue Marriott,"Enterprise: Entrepreneurship and Innovation: Concepts,Contexts and Commercialization" 1e,Routledge, 2012.
3. VeeraBhadrappaHavinal – Management Entrepreneurship – New Age International Publishers.

Dr.D.ArunKumar

CourseCoordinator

HOD

OPEN ELECTIVE – II

P18OEBA006	HUMAN RESOURCE MANAGEMENT	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – UG Level				
	Course Coordinator Name & Department:- P.Srinivasan / BBA				

COURSE OBJECTIVES:-

- Today’s competitive business environment owes its success to effective management of its human resource.
- The quality of the organization’s employees, their attitude, behavior and satisfaction with their jobs, and their behavior towards ethics and values and a sense of fair treatment all impact the firm’s productivity, level of customer service, reputation, and survival.
- The students of human resources management must aware of basic aspects of human resource management to understand the functioning of human resource management in an organizational setting.
- Students gained knowledge in the present day human resources development practice by incorporate themselves in the changing environment of HRM.

COURSE OUTCOMES (COs)

CO1	Identify how firms gain a sustainable competitive advantages through people
CO2	To be aware of the responsibility managers of have concerning human resource management
CO3	Identify the importance of change management.
CO4	To implement basics compensation and performance appraisal
CO5	Importance of labour welfare and grievance handling for employment
CO6	Understand the importance of Employee participation and Relations.

Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	P S	P S
2	CO1	H	H						M	O 2	O 3
	CO2	M	M								
	CO3	L	H								
	CO4	M	L								
	CO5	M	M								
	CO6	H	H								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship(PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT – I **12**

Human Resource Function- Human Resource Philosophy – Changing environments of HRM – Strategic human resource management – Role of HR Managers.

UNIT – II **12**

Recruitment & Placement: Sources, Developing and using application forms - IT and online recruitment - Selection process, basic testing concepts - types of test - work samples & simulation - selection techniques – interview - Designing & conducting the effective interview - computer aided interview.

UNIT – III **12**

Training & Development: Employee Orientation- Training process- Need analysis- Training techniques- special purpose training- Performance appraisal: Methods - Problem and solutions - MBO approach - Performance appraisal in practice.

UNIT – IV **12**

Basic Compensation & Pay plans - factors determining pay rate - Current trends in compensation - Computerized job evaluation - financial incentives - benefits - Insurance benefits - retirement benefits – welfare measure

UNIT – V **12**

Trade unions - Discipline administration - grievances handling - Labour Welfare: Importance & Implications of labour legislations - Employee health.

TEXT BOOKS

1. Dr. R.Venkatapathy&AssissiMenacheri, Industrial Relations &Labour Welfare, Adithya Publications, CBE, 2001. 5. Robert L.Gibson and Marianne H.Mitchell, Introduction to Counseling and Guidance, VI edition, PHI, 2005
2. L.M. Prasad – Human Resource Management – S. Chand & Sons – 2007.

REFERENCEBOOKS

1. Gary Dessler, "

2. zo& Stephen P.Robbins, Personnel/Human Resource Management, Third edition, PHI/Pearson.
3. VSP Rao, Human Resource Management: Text and cases, First edition, Excel Books, New Delhi - 2000.
4. P.SrinivasanHuman Resource Management", Seventh edition, Prentice-Hall of India P.Ltd., Pearson.

David A. DeCen

P.Srinivasan

Course Coordinator

HOD

P18OEBA007	LOGISTICS & SUPPLY CHAIN MANAGEMENT	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course: UG Level				
	Course Coordinator Name & Department:- T.Manjiniprakash / BBA				

COURSE OBJECTIVES:-

- To make the students to understand the usefulness of logistics and supply chain.
- This document lists the course’s major subject areas and the knowledge, comprehension, application, analysis, synthesis and evaluation skills that they are designed to impart.
- Identify the sources of cost in a supply chain.
- Define inventory and types of inventory in a supply chain.
- Define transportation cost and identify the factors that contribute to this cost.
- Calculate inventory cost and transportation cost for a logistics problem.
- Define fixed and variable cost.
- Understand the economies of scale in transportation and inventory cost

• **COURSE OUTCOMES (COs)**

CO1	Identify and Analyze Business Models, Business Strategies and corresponding Competitive Advantage.
CO2	Formulate and implement Warehouse Best Practices and Strategies.
CO3	Plan Warehouse and Logistics operations for optimum utilization of resources
CO4	Apply logistics and purchasing concepts to improve supply chain operations
CO5	Apply quality management tools for process improvement
CO6	Create an ideas about logistics and supply chain management

Mapping of Course Outcomes with Program outcomes (POs)
(1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PS O 1	P S O 2	P S O 3
2	CO1	H	H						H		
	CO2	H	M								
	CO3	M	M								
	CO4	L	M								
	CO5	H	M								
	CO6	M	H								

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core	Core Elective	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship(PR)
								✓		
4	Approval	Academic Council Meeting								

UNIT –I

12

Logistics management and Supply Chain management - Definition, Evolution, Importance. The concepts of logistics. Logistics relationships - Functional applications - Logistics Organization - Logistics in different industries.

UNIT –II

12

Logistics Activities: – objectives, solution. Customer Service, Warehousing and Material Storage, Material Handling, information handling and procurement Transportation and Packaging - Reverse Logistics - Global Logistics

UNIT-III

12

Fundamentals of Supply Chain - Development of SCM - Strategic Supply Chain Management and Key components - Drivers of Supply Chain Performance – key decision areas – External Drivers of Change.

UNIT-IV

12

Supply Chain Drivers and Design Drivers of supply chain performance: Framework for structuring Facilities warehouse – Inventory – Transportation – Information - Sourcing, and Pricing – Revenue management.

UNIT-V

12

Demand and Inventory Aggregate Planning in a Supply Chain: role - strategies Implementation Responding to predictable variability in supply chain – Types of supply chains - creating responsive supply chains lean

TEXT BOOKS

1. Supply Chain Management: Ronald H. Ballou, Samir K. Srivastava, Pearson Education Ltd, Jan 2007.
2. Supply Chain Management: Anil Sinha, McGraw Hill Education, August 2011.

REFERENCE BOOKS

1. Logistics And Supply Chain Management: Martin Christopher, Pearson Education Ltd, 2016.
2. Supply Chain Management: Sunil Chopra, Peter Meindl, Dharma Virus Kalra, Pearson Education Ltd, 2016.
3. Supply Chain And Logistics Management: V. Anandaraj, S. Kumaran, IshankaSaikira, Airwalk Publication, Jan 2018.

T.Manjiniprakash.

Course Coordinator

HOD

		OFFICE MANAGEMENT				L	T	P	C		
P18OEBA008	Total Contact Hours – 60	4	0	0	4						
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- D.K.Sowmiyalakshmi /BBA										
COURSE OBJECTIVES: -											
<ul style="list-style-type: none"> To familiarize the students with the basic fundamentals of accounting. To impart knowledge on final accounts of sole trading concern. To enable the students on the concept of income & expenditure and receipts and payments. 											
COURSE OUTCOMES (COs)											
CO1	To make them understand office management and duties of an office manager										
CO2	To give an idea about proper filing and indexing of office documents										
CO3	To understand the principles of record management and different types of records in business organization.										
CO4	To enable them to aware about safety hazardous and steps to improve office safety.										
CO5	To introduce different measures of office work										
CO6	Create an ideas about office management										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	P S	P S
2	CO1	H	H						H	O	O
	CO2	M	M								
	CO3	M	H								
	CO4	L	H								
	CO5	H	H								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship(PR)	
								✓			
4	Approval	Academic Council Meeting									

UNIT –I **12**
Introduction: Meaning, functions and importance of office management; office management and organization. Principles of office management and organization. Principal departments of modern office.

UNIT-II **12**
Office Manager: qualities of office manager. The authorities and responsibilities of an office manager. Office accommodation: Selection of site. Office layout. Environment and working conditions.

UNIT-III **12**
Office equipment's - Reproduction equipment - Typewriter - Duplicators - Photo Copier - Communication Equipment - Intercom - Telephone - Use of Computers in Office Management Office System - Procedure - Routine - And methods - Paper work in office Filling functions.

UNIT-IV **12**
Office Communication: Various means of communication- Their use, Correspondence through Internet - Office Correspondence -Central vs. Departmental Correspondence - Handling Mail - Postal Services - Oral written - Internal and external communication - Records Management Types - Forms Controls - Principles - Foremost -Continuous stationery

UNIT-V **12**
Office Supervisor - Meaning and characteristics of Supervisor - Status - Place and Role of Supervisor - Effective Supervisor - Qualification - skill of Supervisor.

TEXT BOOKS

1. Modern Office Management: N. D Sharma, And Publishers, Jan 2006.
2. Office Management: Prashansa K. Ghosh, S. Chand & Sons, Jan 2010

REFERENCE BOOKS

1. Office Management: R.S.N Pillai&Bhagavathi, S. Chandler & Come, Dec 2010.
2. Office Management: R. Nangia, G. K Gupta, Crescent Publishing House.
3. Office Management: Dr. R. K Chopra, PriyankaGauri, Himalaya Publishing House, Jan 2017.
4. Of Non-Trading Organization-Receipts And Payment Account- Income And Expenditure Account

D.K.Sowmiyalakshmi

CourseCoordinator

HOD

P180EVC001	PHOTOGRAPHY AND VIDEOGRAPHY						L	T	P	C	
	Total Contact Hours – 60						4	0	0	4	
	Prerequisite – UG Level										
	Course Coordinator Name & Department:- P. Nagarajan, Dept of Visual Communication										
COURSE OBJECTIVES											
<ul style="list-style-type: none"> To understand the fundamentals of Photography and Videography To examine the technical factors of indoor and outdoor photography and Videography To enable the students to equip themselves to become a photography and Videography professionals. 											
COURSE OUTCOMES (COs)											
CO1	Can analyze the fundamentals of Photography and Videography										
CO2	Understanding of the camera operations										
CO3	Evaluating the lighting										
CO4	Can be aware of the wrong exposures										
CO5	Can promote various types of photography and Videography										
CO6	Understanding the concept of photo-journalism										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)			
								*			
4	Approval	Academic Council Meeting									

UNIT-I: **12**

Human Eye and Camera. Basics of Camera (aperture, shutter speed, focal length, f-stop, depth of field etc.) Camera operations, Introduction to Television Production, Types of telecasting, Television Crew, an overview of direction.

UNIT-II: **12**

Types of Still and video cameras. Types of Lenses. Visual Perception, Art direction, floor management- indoor & outdoor, production management, budget preparation. Locations: Indoor, set, on-sights sets, - Outdoor on-sight sets, blue matte. Etc.,

UNIT-III: **12**

Understanding lighting-indoor and outdoor, Exposing and Focusing, Types of lighting, Natural and Artificial Lights, Controlling lights, Exposure Meters. Camera techniques & operation, Framing, shots & movements (wide, medium, close ups, shadow, zoom, pan, tilt, aerial etc.),

UNIT-IV: **12**

Photography for advertising-Consumer and industrial. Usage of various types of camera lenses (Normal, Tele, Zoom etc.), usages of various filters (day ,night, colour correcting filter, diffusion filter), objectives TV lighting, various types of Lights (baby, Junior, Senior, etc..)

UNIT- V: **12**

Basics of photo-journalism, Photo-features, Photo - essays, Writing captions, Visual story telling. Planning a shoot-studio, location, set props and casting. Colour temperature, lighting for different situations (interviews, indoor, out-door), types of lighting(Back, Front, full, semi, etc.,)

TEXT BOOKS:

- 1.The Art of Photography: A Personal Approach to Artistic Expression, Barnbaum, Bruce, Rocky Nook
- 2.Photography Demystified: Your Guide to Gaining Creative Control, David McKay, Photography Inc.
3. Television Productions: A History of All Series and Pilots, by JonAbbott, Publisher: McFarland & Company (May 13, 2009)
- 4.Production Management for TV and Film: The Professional's Guide, Methuen Drama (August 1, 2010)

REFERENCE BOOKS:

- 1.The Photographer’s Eye,Szarkowski, John, The Museum of Modern Art, New York (Publisher)
- 2.Creative Composition: Digital Photography Tips and Techniques, Davis, Harold, Wiley
- 3.From Concept to Screen: An Overview of Film and Television Production, Robert Benedetti, Pearson; 1 edition (June 11, 2001)
- 4.The Television Handbook, Routledge, Holland, P (1999)

Course Coordinator

HOD

P180EEN001	SOFT SKILLS							L	T	P	C
	Total Contact Hours – 30							2	0	0	2
	Prerequisite – Higher Secondary Level										
Course coordinator name & Dept: Mrs. Caroline– English											
<p>COURSE OBJECTIVES:- To effectively complement the already existing Hard Skills so that the combination becomes a winning blend that could project the candidate’s true worth in proper perspective.</p>											
COURSE OUTCOMES (COs)											
CO1	Remember the personal as well as professionals goals of the students										
CO2	Understand the manners during professional meetings										
CO3	Apply the right reasons of stress										
CO4	Analyze the importance of communication skills										
CO5	Evaluate the excellence in both personal and professional life										
CO6	Create the Growth & development of soft skills										
<p>Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low</p>											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	H						H		
	CO2	H	H								
	CO3	H	H								
	CO4	H	L								
	CO5	H	L								
	CO6	H	H								

3	Category	Humanities & Social Studies (HS)	Basic Sciences	Engg Sciences (ES)	Professional Core	Core Elective	Non-Major Elective	Open Elective (OE)	Any other	Project/Term Paper/Seminar/Internship
								✓	✓	
4	Approval	Academic Council Meeting								

UNIT I- LISTENING / VIEWING

6

Listening and note-taking – Listening to telephonic conversations – Ted talks – Inspiring Speeches – Watching documentaries on personalities, places, socio-cultural events, TV news programmes and discussions to answer different kinds questions, viz., identifying key idea and comprehension questions... so on.

UNIT II- SPEAKING

6

Elements of presentation skills-Structure of presentation-presentation tools- mock interviews – group discussion – introducing one self and others – welcome address and proposing a vote of thanks- role play – debating.

UNIT III - READING

6

Different genres of text (literature, media, technical) for comprehension – Reading strategies like note-making – reading graphs, charts and graphic organizer – Sequencing sentences – reading online sources like e-books, e-journals and e-newspapers.

UNIT IV - WRITING

6

Resume/Report preparation/Letter Writing-Structuring the resume-comprehension-Describing charts and tables – writing for media on current events.

UNIT V- PROJECT

6

Gender injustice: Dowry-Violence against women -Sexual Harassment -Eve teasing-Female infanticide-Prostitution. **Social problem:** Poverty-unemployment-Child Labour-Terrorism-Drug abuse-Alcoholism-Corruption. **Industrial problem:** Work and Labour organization-Elements-Principles-Staff and Functional Activities. **Industrial Conflict:** Strikes-Disputes-Grievances-Industrial development in India-Steps in Automation process-Industrial policy-Liberation.

Text books

- 1 .Rizvi ashraf ,Effective Technical Communication , Tata amcgraw Hill Education Private Ltd,New Delhi,2011.
2. Townsend Roz , Presentation skills for the upwardly mobile , Emerald Publishers .

Reference

1. T.M.Farhathullah, communication skills for Technical students, Orient Longman Ltd,2002.

2. Andree J Rutherford, Basic communication skills for Technology, Pearson Education,Asia (Singapore) Pte.Ltd, Banglore , 2001.

Course Coordinator

HOD

P18OEEN002	MASS MEDIA AND COMMUNICATION						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite – UG Level										
	Course coordinator & Dept :- Dr.P.AROCKIA NATHAN - English										
COURSE OBJECTIVES : To impart students with the efficient knowledge of important events in through literature											
COURSE OUTCOMES (COs)											
CO1	Remember the art of writing, report and editing										
CO2	Understand the skills of writing										
CO3	Apply the Role & importance in social change										
CO4	Analyze the social structure of Indian society										
CO5	Evaluate the growth & development of communication and media										
CO6	Create the interpreting the meaning from the text										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO2
2	CO1	H	L						H		
	CO2	H									
	CO3	H	L								
	CO4	H	L								
	CO5	H									
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
								√			
4	Approval	Academic Council Meeting									

UNIT I -Communication and Media	6
Communication & Media: Definition, meaning and concept.	
Different types of communication: verbal and written	
Scope and Process of Mass Media & Communication	
UNIT II -History of Mass media	6
History of the development of electric media in India: Radio & TV	
Role of media in society, Impact of media on audience,	
Media effects, limitations and different form of media.	
UNIT- III- Role & Responsibilities	6
Role and responsibilities of journalist, ethics, careers,	
Media management, Media laws in India, and freedom of press	
Qualities and Responsibilities of a reporter	
UNIT IV -Theories & Principles	6
Theories and Principles of Editing	
Communication and theories of social change,	
Role of media in social change, Development communication	
UNIT V-Technology & Development	6
Changing trends of mass communication under the process of globalization	
Technology in the development of media.	

Text Books

1. Vivian, John, Mass Media & communication Boston, Massachusetts : Pearson Allyn and Bacon, c.2008.
2. Stovall, James Glen, Writing for the mass media, New Jersey : Pearson Education, Inc., c.2012

Reference Books:

1. Parthasarathy, Rangaswami, journalism in India, sterling Publisher pvt. Ltd. New Delhi.
2. D.S. Mehta. Mass communication and Journalism in India New Delhi, Allied Publishers, 2011

Course Coordinator

HOD

P18OESC001		COMPUTER APPLICATIONS					L	T	P	C	
		Total Contact Hours – 30					2	0	0	2	
		Prerequisite course – UG Level									
		Course Coordinator Name & Department:- Dr. S.Thiru Nirai Senthil / BCA									
COURSE OBJECTIVES:-											
Learners will be familiar with basic of computer application. Learners will understand the applications of computer & able to know about the operating systems.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge in fundamental computer applications										
CO2	Understand the concept of input device functions										
CO3	Identify the suitable input devices for application										
CO4	Analyze the input and output devices and its processes										
CO5	Evaluate data and storage devices for application										
CO6	Create an real time application using a system software and application software										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L							H	
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/	
								✓			
4	Approval	Academic Council Meeting									

UNIT I **6**
Brief History of Development of Computers ,Computer System Concept, Computer System Characteristics ,Capabilities and Limitations, Types of Computers-Personal Computer (PCs) - IBM PCs, Types of PCs- Desktop, Laptop, Notebook, Palmtop, etc. Basic Components of a Computer System - Control Unit, ALU, Input/ Output Unit-Memory, Storage Fundamentals - Primary Vs Secondary memory.

UNIT II **6**
Input Devices : Keyboard, Mouse, Joystick, Scanners, Digital Camera, MICR,OCR, OMR, ,Light pen, Touch Screen.

UNIT III **6**
Output Devices: Monitors - Characteristics and types of monitor, Size, Resolution, Refresh Rate, Dot Pitch, Video Standard - VGA, SVGA, XGA etc. Printers - Daisy wheel, Dot Matrix, Inkjet, Laser. Plotter, Sound Card and Speakers.

UNIT IV **6**
Various Storage Devices - Magnetic Disks, Hard Disk Drives, Floppy, Disks, Optical Disks.

UNIT V **6**
Computer Software, Need, Types of Software - System software, Application software System Software - Operating System, Compiler , Assemblers, Interpreter.

TEXT BOOKS:

1. S.K. Basandra, “Computers Today”, Galgotia Publications,2010.
2. Alexis Leon & Mathews Leon, “Fundamentals of Information Technology”, Vikas Publishing House, New Delhi,2009.

REFERENCE BOOKS:

1. Rajeev Mathur, “Dos Quick Reference”, Galgotia Publications.

Course Coordinator

HOD

P18OESC002	MULTIMEDIA							L	T	P	C
	Total Contact Hours – 30							2	0	0	2
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- Dr. S.Thiru Nirai Senthil / BCA										
COURSE OBJECTIVES:- To Understand the basic multimedia concepts and designing concepts.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge in basic concepts of multimedia										
CO2	Analyze the multimedia application problems.										
CO3	Understand the Video capturing, Sound capturing, editing concepts.										
CO4	Identify the basic multimedia design principles.										
CO5	Evaluate the multimedia system and Design Process.										
CO6	Create a real time application using a multimedia concept.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								
	CO2	H	-								
	CO3	H	-								H
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/	
								✓			
4	Approval	Academic Council Meeting									

Multimedia Fundamentals: Concept of multimedia, Fundamental criteria for the design of a multimedia presentation, Multimedia Application Goals & Objectives, opportunities in multimedia production.

UNIT II

6

Role of multimedia-development of team members, avoiding problems in planning a multimedia application.

UNIT III

6

Multimedia Building Blocks: Text, Graphics, Video capturing, Sound capturing, editing.

UNIT IV

6

Basic design principle: proximity, visual hierarchy, Symmetry, Asymmetry, Repetition, unity, Contrast, dynamics, Emphasis, Multimedia Authoring tools.

UNIT V

6

Design, Development and evaluation of multimedia a system, Development of user interface design, Design Process.

Text Books

1. John Villamil, Casanova, Louis Molina, "An introduction to multimedia",1998.
2. Mohammad Dastbaz, "Designing Interactive Multimedia Systems",2002.

Reference Books

1. Bohdan O. Szuprowicz, "Multimedia Networking",1995.
2. Stephen McGloughlin, "Multimedia on the web",1997.

Course Coordinator

HOD

P18OESC003	ADVANCED EXCEL							L	T	P	C
	Total Contact Hours – 30							2	0	0	2
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- S.Anupriya / BCA										
COURSE OBJECTIVES:- To identify the various functions in Excel Sheet											
COURSE OUTCOMES (COs)											
CO1	Understand the advanced Excel formulas.										
CO2	Evaluate IF conditions, AND, OR functions.										
CO3	Analyze the advanced filter options.										
CO4	Execute the multiple windows, splitting windows management.										
CO5	Understand the pivot table methods.										
CO6	Create a real time application by creating, modifying Excel sheet.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H	L								
	CO3	H	L	M	M						
	CO4	H	L	M	M						
	CO5	H	L	M	M						
	CO6	H	L	M	M						
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/	
								✓			
4	Approval	Academic Council Meeting									

UNIT I **6**

Uses of Advance Excel Formulas -VLOOKUP, HLOOKUP, SUMIF, SUMIFS, SUMPRODUCT, DSUM, COUNTIF, COUNTIFS, IF, IFERROR, ISERROR, ISNA, ISNUMBER, ISNONTEXT, OR, AND, SEARCH, INDEX, MATCH etc

UNIT II **6**

Various Methods and Uses of IF Conditions , Usage of "IF" Conditions? , Creation of Multiple IF Conditions in One Cell , Use the IF Conditions with the Other Advance Functions, How to use nested IF statements in Excel with AND, OR Functions Sorting, Data Forms, Adding Data Using the Data Form, Finding Records Using Criteria

UNIT III **6**

Filtering Data, AutoFilter, Totals and Subtotals, Row, Various Methods of Filter and Advance Filter options , Creating and Updating Subtotals , Various Method of Sorting Data ,Creating, Formatting and Modifying Chart.

UNIT IV **6**

Customizing the Quick Access Tool Bar , Managing Windows ,Multiple Windows , Splitting Windows.

UNIT V **6**

Various Methods and Options of Pivot Table, Using the Pivot Table Wizard, Changing the Pivot Table Layout, Subtotal and Grand total Options, Formatting, and Grouping items

Text Books

1. Jordan Goldmeler, “Advanced Excel Essentials” ,A Press, 2015 edition.

Reference Books

1. John Walkenbach, “Microsoft Excel 2013 Bible”, Wiley Publications,2013.

Course Coordinator

HOD

P18OESC004	WEB DESIGNING							L	T	P	C
	Total Contact Hours – 30							2	0	0	2
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- V.Ramya/BCA										
COURSE OBJECTIVES:- To Understand the basic web designing concepts.											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge in web basics and server side scripting.										
CO2	Execute the HTML coding.										
CO3	Apply hyper links between webpages										
CO4	Evaluate the Embedded Style Sheets & Linking External Style Sheets.										
CO5	Create the backgrounds and user style sheets.										
CO6	Create a real time application using web designing concept.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H									
	CO3	H									
	CO4	H									
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/	
								✓			
4	Approval	Academic Council Meeting									

UNIT I **6**
Introduction - The Internet in Industry and Research - Evolution of the Internet and World Wide Web - Web Basics – Client Side Scripting versus Server Side Scripting.

UNIT II **6**
Introduction – First HTML example – Headings – Linking - Images, alt Attribute, Void Elements.

UNIT III **6**
Using Images as Hyperlinks-Special Characters and Horizontal Rules – Lists – Tables.

UNIT IV **6**
Introduction - Inline Styles - Embedded Style Sheets - Linking External Style Sheets

UNIT V **6**
Backgrounds - Element Dimensions - Box Model and Text Flow - Drop-Down Menus - User Style Sheets.

Text Books

1. Paul Deitel, Harvey Deitel, Abbey Deitel, “Internet & World Wide Web: How To Program”, 5th Edition, Pearson Publication, 2012.

Reference Books

1. Jennifer Niederst Robbins, “Learning Web Design”, Fourth Edition, O’Reilly Media, 2012.
2. Thomas Michaud, “Foundations of Web Design, Introduction to HTML & CSS”, Pearson Publication, 2014.
3. Bayross, “Web Enable Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI”, BPB Publications, 2010.
4. T. A Powell, “Complete Reference HTML (Third Edition)”, TMH, 2002.

Course Coordinator

HOD

P18OESC005	PHOTOSHOP						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- V.Brindha/BCA										
COURSE OBJECTIVES:-											
Learners can Apply methods to specific 3D Images and to identify various designs appropriate for Animation											
COURSE OUTCOMES (COs)											
CO1	Gain knowledge to Create and save Images in fundamental computer applications										
CO2	Understand the title bar, menu bar, option bar, image title bar in photo shop program.										
CO3	Execute Zooming & Panning an Image while Working with Images.										
CO4	Analyze Color manipulations & Working with Toolbox										
CO5	Gain knowledge in Working with layers.										
CO6	Create a real time application using 3D image and Animation.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H	-								
	CO3	H	-								
	CO4	H	-								
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/	
								✓			
4	Approval	Academic Council Meeting									

UNIT I**6**

Introduction to Adobe photoshop, Getting started with photoshop, creating and saving a document in photoshop, page layout and back ground.

UNIT II**6**

Photoshop program window-titlebar, menu bar, option bar, image window, image title bar, status bar, ruler, palettes ,tool box, screen modes, saving files, reverting files, closing files.

UNIT III**6**

Images: working with images, image size and resolution, image editing, color modes and adjustments, Zooming & Panning an Image, Rulers, Guides & Grids-Cropping & Straightening an Image, image backgrounds, making selections.

UNIT IV**6**

Working with tool box: working with pen tool, save and load selection-working with erasers- working with text and brushes-Color manipulations: color modes- Levels – Curves - Seeing Color accurately - Patch tool

UNIT V**6**

Layers: Working with layers- layer styles- opacity-adjustment layers.

Text Books

1. Reema Thareja ,”Fundamentals of Computers”,Oxford University Press,2014.

Reference Books

1. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color
2. Adobe Creative Team ,”Adobe Photoshop Class Room in a Book”,2014.

Course Coordinator**HOD**

P18OESC006	FLASH						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- N.Mathimagal/ BCA										
COURSE OBJECTIVES:- Learners can identify methods appropriate for Basic Animation. Apply methods to design with flash.											
COURSE OUTCOMES (COs)											
CO1	Understand inWorking with flash, drawing with flash using Animation tools and Mixer.										
CO2	Execute working with multiple objects, importing color palettes										
CO3	Analyze Basic animation and working in the timeline,										
CO4	Create Frames, key frames, deleting, copying and reversing frames										
CO5	Evaluate the Shape tweening and shape hinting in motion										
CO6	Apply methods to design with flash										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H	-								
	CO3	H	-								
	CO4	H									
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/	
								✓			
4	Approval	Academic Council Meeting									

UNIT I **6**
Working with flash, drawing with flash, drawing with the pencil, modifying lines, drawing with the pen, the oval and rectangle tools, free transform tool, envelope modifier, the brush tool, using the mixer.

UNIT II **6**
Adding custom colors to color palette, importing color palettes, working with multiple objects, grouping objects.

UNIT III **6**
Basic animation and working in the timeline, the timeline, movie properties.

UNIT IV **6**
Frames vs. key frames, deleting, copying, and reversing frames, frame-by-frame vector animation, Animation on an image.

UNIT V **6**
Shape twining , shape hinting , Shape tweening text , edit multiple frames , animating gradients, basic motion tweening.

Text Books

- 1.Nick Vandome ,“FLASH 5 in easy steps” , ,Dreamtech press,2001.

Reference Books

1. E A Vander Veer &Chris Graver, “Flash CS3”,Orelly Publications,2009.

Course Coordinator

HOD

P18OESC007	COMPUTER HARDWARE AND NETWORKING						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- V.Ramya/BCA										
COURSE OBJECTIVES:-											
Learners familiar with the basic concepts of Microprosser,Controller, Server and to demonstrate the traditional imperative design of CPUs,cards,PCsand BIOS.											
COURSE OUTCOMES (COs)											
CO1	Design the structure of Micro Processor and PCs and CPUs										
CO2	Understand the structure of PC architecture and the study of various PCs										
CO3	Understand the Basics of Processor										
CO4	Study the CPU,Chips,Processor and Controllers										
CO5	Working with Internal Components cards and Higher Level Processor										
CO6	Used to develop the Backups,Switches Routers,BIOS,Floppy Disk and zip Driver										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO 2	PSO 3
2	CO1	3	3	1	1	1	1	3	H		
	CO2	3	3	1	2	2	2	3			
	CO3	3	2	3	1	3	3	3			
	CO4	3	2	2	1	1	2	3			
	CO5	2	2	2	1	1	1	3			
	CO6	3	3	3	2	3	3	3			
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/	
								✓			
4	Approval	Academic Council Meeting									

Microprocessor System - Introduction of System overview, Introduction to Processors, Memory Interfacing, Interfacing I/O Devices, Interfacing Data Converters, Display Interface, Serial I/O and Data Communication, Higher level Processors.

UNIT II

6

Introduction to PC Architecture Study of PC-AT/ATX System, Pentium, Core, Core 2 Cord, Core 2 Duo, I3, I5, I7.

UNIT III

6

Processor Basics of Processor and CPU Block Diagram of Computer and Computer Generation Motherboards, Chipset and Controllers, BIOS and the Boot Process, Computer Memory.

UNIT IV

6

Internal Components IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Fire-Wire Cards, Internal Ports, Cables and Connector Types.

UNIT V

6

Introduction of Network Cable like UTP, STP, Fiber Optics, Hub, Unmanageable Switch, Manageable Switch, Router, Modem, Wi-Fi, Access Point, PCI Wireless Card, USB Wireless Device, Print Server, USB Network Sharer, Backup Device, Server Hardware etc.

Text Books

1. Ramesh Gaonkar, “Microprocessor Architecture Programming and Application with the 8085”, Penram International Publication, October 2013.

Reference Books:-

1. M.L. Gupta, “Electronics and Radio Engineering”, Dhanpat rai & Sons, New Delhi.
2. B. Govinda rajalu, “PC AND CLONES Hardware, Troubleshooting and Maintenance”, Tata Mc-graw-Hill Publication.
3. Stephen J. Bigelow, “PC Troubleshooting and Repair”, Dream tech Press, New Delhi.

Course Coordinator

HOD

		COMPUTER PROGRAMMING					L	T	P	C	
P18OESC008	Total Contact Hours – 30	2	0	0	2						
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- S.Anupriya/ BCA										
COURSE OBJECTIVES:-											
Learners understand the basic concepts of C programming. Practice the use of conditional and looping statements. Implement arrays, functions and pointers. Gain skills to handle strings and files.											
COURSE OUTCOMES (COs)											
CO1	Understand the concept of data types, loops, functions, array, pointers, string, structures and files.										
CO2	Design flow-chart, algorithm and program logic.										
CO3	Analyze problems, errors and exceptions.										
CO4	Apply programming concepts to compile and debug c programs to find solutions.										
CO5	Gain knowledge to use Function, Pointers, Structures, Unions & preprocessor directives										
CO6	Construct programs that demonstrate effective use of C.										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L						H		
	CO2	H	L								
	CO3	H	L	M				H			
	CO4	H	L	M				H			
	CO5	H	L	M				H			
	CO6	H	L	M				H			
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
								✓			
4	Approval	Academic Council Meeting									

UNIT I **6**
Generation and Classification of Computers, Basic organization of a Computer, Number System, Binary, Decimal, Conversion, Problems.

UNIT II **6**
Algorithm, Pseudo code, Flow Chart, Problem formulation, Problem solving , Introduction to “C” programming, Fundamentals, Structure of C Program , compilation and linking processes, Constants, Variables, Data Types.

UNIT III **6**
Expressions using operators in C, Managing input and output operations, Decision making and Branching, Looping Statements.

UNIT IV **6**
Arrays, Initialization, Declaration, One Dimensional and Two Dimensional Arrays, String, String Operations, String Arrays.

UNIT V **6**
Function, Definition of Function, Declaration of Function, Recursion, pointers, pointer and arrays, Structure data type, Structure definition, Structure declaration, Structure within a structure, Union, Storage classes, Pre-processor directives.

Text Books:-

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and programming in C”, Dorling Kindersley (India) Pvt Ltd., Pearson Education in South Asia 2011.
2. Pradip Dey, Manas Ghosh, “fundamentals of computing and programming in c”, First edition, Oxford University Press, 2009.
3. Yashavant P. Kanethar, “Let Us C”, BPB Publications, 2011.

Reference Books:-

1. Byron S Gottfried, “ Programming with C”, Schaum’s Outlines, 2nd Edition, Tata McGraw-Hill 2006.
2. Dromey R.G., “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007.
3. Kernighan., B.W and Ritchie, D.M, “ The C Programming Language”, Second Edition, Pearson Education, 2006.

Course Coordinator

HOD

P18OESC009	OFFICE AUTOMATION TOOLS						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – UG Level										
	Course Coordinator Name & Department:- V.Brindha/BCA										
COURSE OBJECTIVES:- Learners understand the basic concepts of word, Excel, Power Point.											
COURSE OUTCOMES (COs)											
CO1	Understand the text manipulations for word documents.										
CO2	Analyze the templates and mail merge concepts.										
CO3	Apply the cell editing, formulae, built in functions used in the Excel Sheet.										
CO4	Develop the power point slide designs and backgrounds.										
CO5	Develop the graphics and animations using wizards.										
CO6	Create a document and apply various formatting techniques										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L								H
	CO2	H	L								
	CO3	H	L	M				H			
	CO4	H	L	M				H			
	CO5	H	L	M				H			
	CO6	H	L	M				H			
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/Internship (PR)	
								✓			
4	Approval	Academic Council Meeting									

UNIT I**6**

Text Manipulations- font size, style, color. Alignment- left, right and justify, paragraph alignment, Usage of Numbering, Bullets, Footer and Headers, Usage of Spell check, and Find & Replace, Text Formatting, Picture insertion and alignment.

UNIT II**6**

Insertion – Table, chart, clip art, shapes, borders. Creation of documents, saving of documents, using templates, Creation templates, Mail Merge Concepts, Copying Text & Pictures from Excel.

UNIT III**6**

Creating of Excel sheet, Cell Editing, Usage of Formulae and Built-in Functions, File Manipulations, Data Sorting, Worksheet Preparation, Drawing Graphs, Usage of Auto Formatting.

UNIT IV**6**

Start power point, Create blank presentation, Selecting slide layout , Insert new slide, Editing presentation , Designing and formatting presentation , Change font, font color, size, style of text, Bullet and numbering, Slide design, layout, change background , preparing slide show presentation.

UNIT V**6**

Inserting Clip arts and Pictures, Frame movements, Insertion of new slides. Preparation of Organization Charts, Presentation using Wizards, Usage of design templates, working with tables, graphics and animation, working with graphs and organization charts.

Text Books

1. Joyce Cox, Joan Lambert and Curtis Fryc, “Step by Step Microsoft Office Professional 2010”, Microsoft press edition.

Reference Books

1. Ralph T.Reilly, “The Handbook of Office Automation”, Universe Publications,2012.

Course Coordinator**HOD**

U18OEMI001	CLINICAL MICROBIOLOGY						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – Under graduate degree in any discipline										
	Course Coordinator Name & Department:- Dr. J. Senthil & Microbiology										
COURSE OBJECTIVES:-											
Learners will be familiar with microbiological related diagnostic techniques. Learners will understand the microbial morphology, structure, characters, classification, diseases and diagnostic tests.											
COURSE OUTCOMES (COs)											
CO1	Recall the general classification of microbes.										
CO2	Recognize the different specimen collection methods and staining methods.										
CO3	Apply different diagnostic tests to identify the diseases.										
CO4	Apply the role of human pathogens in causing diseases.										
CO5	Analyze the importance of antimicrobial compounds.										
CO6	Analyze and develop new antimicrobial drugs and antibiotics against wide range of pathogens.										
Mapping of Course Outcomes with Program Outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L Low											
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	PS O2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
								✓			
4	Approval	Academic Council Meeting									

UNIT I	6
General introduction about clinical microbiology, Sterilization and Disinfection., Culture Media preparation, Staining Methods, Collection and Transportation of Specimen - General Principles, Containers, Rejection, Samples - Urine, Faeces, Sputum, Pus, Body fluids, Swab, Blood, Disposal of Laboratory/Hospital Waste.	
UNIT II	6
General characters and classification of bacteria, Characteristics - Growth and maintenance of Bacteria, Pathogenicity and diagnosis of bacterial pathogens, antimicrobial compounds against clinical pathogens.	
UNIT III	6
Morphology and structure of fungi - Classification of fungi - Nutrition and cultivation of fungus - Cutaneous & Sub cutaneous and Systemic Mycosis - Lab diagnosis of fungal Infections - Opportunistic fungal infections.	
UNIT IV	6
General characters of viruses. - Classification of viruses. - Lab diagnosis of viral infections. - Cultivation of viruses. - Bacteriophages - Retro viruses - HIV, Hepatitis virus, Pox virus . - Picorna virus - Polio. - Orthomyxo virus - Influenza. - Arbo virus - Chikungunya, Dengue. - Herpes and Adeno virus.	
UNIT V	6
Definition - parasitism, host, vectors etc. Classification of Parasites, Phylum Protozoa-general Pathogenic and non pathogenic protozoa, Phylum Nematelminthes/Round words (Nematoda), Phylum Platyhelminthes - class - Cestoda, class - Trematoda, Lab diagnosis of parasitic infections.	
TEXT BOOKS:	
1. Monica Chees Brough. Medical laboratory manual for tropical countries, Elsevier Health Sciences, Butter worths, 1987.	
2. Bailey and Scott. Diagnostic Microbiology, Eighth edition, The Mosby Company, 1990.	
REFERENCE BOOKS:	
1. Keith Struthers K. Clinical Microbiology, 2 nd Edition, CRC Press, 2017.	
2. Jennie Wilson. Clinical Microbiology -An Introduction for Healthcare Professional, 8 th Edition, Bailière Tindall, 2000.	
Course Coordinator	HOD

U18OEMIO 02	HERBAL MEDICINE						L	T	P	C										
	Total Contact Hours – 30						2	0	0	2										
	Prerequisite course – Under graduate degree in any discipline																			
	Course Coordinator Name & Department:- Dr. J. Senthil & Microbiology																			
COURSE OBJECTIVES:- Learners will be familiar with medicinal herbs. Learners will understand the importance of herbal drugs and herbal therapies.																				
COURSE OUTCOMES (COs)																				
CO1	Recall the herbal medicines used in daily life.																			
CO2	Recognize the different methods of herbal extraction and its types.																			
CO3	Apply various herbal medicines in curing the diseases.																			
CO4	Analyze the role of herbs in drug discovery.																			
CO5	Evaluate the importance and toxicity studies of herbal extracts.																			
CO6	Create and develop new drugs from wide range of medicinal plants available worldwide.																			
Mapping of Course Outcomes with Program Outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L Low																				
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6		PO7	PS O1	PSO2	PSO3								
2	CO1									H										
	CO2																			
	CO3																			
	CO4																			
	CO5																			
	CO6																			
3	Category	Humanities & Social Studies (HS)		Basic Sciences (BS)		Engg Sciences (ES)		Professional Core (PC)		Core Elective (CE)		Non-Major Elective (NE)		Open Elective (OE)		Any other		Project/Term Paper/Seminar/ Internship (PR)		
4	Approval	Academic Council Meeting																		

UNIT I	6
Definition of Herbal drug, Importance of Herbal therapies, Herbs used as nutraceuticals and healing agents. Making and using herbal medicines for common ailments like cold, skin infections and Diarrhea; Analytical Profiles of selected herbs.	
UNIT II	6
General methods of extraction, types and principles of extractions - merits and demerits, selection of suitable extraction methods, purification and recovery of solvents	
UNIT III	6
Different methods for isolation and estimation of phyto-constituents from medicinal herbs like <i>Mucuna pruriens</i> , <i>Garcinia combogia</i> , Green tea, <i>Hypericum species</i> etc.	
UNIT IV	6
Qualitative and Quantitative estimation of standardized extracts by HPTLC, Biological standardization -Pharmacological screening of herbal extracts and Microbiological evaluation of herbal extracts, Toxicity studies of herbal extracts.	
UNIT V	6
Herbal drugs acting on brain and nervous system – Rheumatoid arthritis – Psychoactive drugs – Depressants, Stimulants, hallucinogens – sources, effects, basic mechanism of action.	
TEXT BOOKS:	
1. Indian Herbal Pharmacopoeia, Vol.1 & 2, RRL, 1 DMA, 1998, 2000.	
2. Kokate CK, Purohit and Gokhlae. Text book of Pharmacognosy, 4 th edition, Nirali Prakashan, 1996.	
REFERENCE BOOKS:	
1. Toxicology and Clinical Pharmacology of Herbal Products, Melanie Johns Cupp.	
2. Choudhary RD. Herbal drug industry, 1 st edition, Eastern publisher, New Delhi, 1996.	
Course Coordinator	HOD

P18OEPH001	ELECTRICAL TECHNICIAN					L	T	P	C
	Total Contact Hours - 30					2	0	0	2
	Prerequisite – B.Sc Physics								
	Course Coordinator Name & Department:- – Dr. S.Anandhi / Physics								

COURSE OBJECTIVES: Students will have an appreciation on the electrical systems and electrical equipment typically used in the Oil and Gas production plant

COURSE OUTCOMES (COs)

CO1	Analyze and solve routine technical problems related to electrical systems by applying mathematics and science principles.
CO2	Explain how to used electrical tools, operate and maintain specific equipment in the Oil and Gas production plant
CO3	Explain how to perform corrective and preventive maintenance in electrical tasks.
CO4	Understand the work on electrical systems safely and efficiently.
CO5	Understand the electrical system and electrical equipment used in the Oil and Gas production plant.
CO6	To execute the working principle and process of the transformer and classification of transformer

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O2
2	CO1	H	H						H		
	CO2	H	H								
	CO3	M	M								
	CO4	M	H								
	CO5	H	H								
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT-I	6
Basic Principle Of Petroleum - Overview of Oil and Gas Processing -Wellhead Platform and Equipment	
UNIT –II	6
Introduction to Instrumentation -P & ID Drawing -Introduction to Distributed Control System (DCS)	
UNIT –III	6
Safety in Electrical Maintenance - Batteries and Chargers -Reading Electrical Diagrams - Cables and Conductors - Terminations and Splices - Motor Branch Circuit Protections	
UNIT –IV	6
Three Phase AC Induction Motors - AC Generator Maintenance -Fire & Gas Detection and Safety Systems and SIS -DC Generator -Construction& Principle- Types-Series,- Shunt & Compound Generator- EMF equation, Characteristics - (OCC & LCC). Armature reactions,- commutation Efficiency, Regulation & Applications. DC Motor- Construction& Principle. Types- Series, Shunt & Compound Motors. Characteristics curve-Applications. Necessity of starter- Construction and Working of- starters (3 point& 4 point). Speed control of DC Shunt-motor (armature & Field control. Traction System.- Trouble shooting –Care and maintenance.	
UNIT-V	6
Transformer –Principle -Construction- Classification of Transformers - EMF equation ,rating - Loading, Losses & Efficiency Regulation. Parallel Operation- Cooling methods, Transformer- oil testing. Care and maintenance,- Protective devices. Tap Changer – ON load and OFF- load. Auto transformer, Instrument- Transformer- CT & PT. Welding Transformer.	
TEXT BOOKS	
1.	Fundamental Electrical circuits by Charles K.Alexandeer and Matthew NO Sadiku(2003)
2.	Fundamental of Digital circuits 3 rd edition by Kumar A Anandh
Course Coordinator	HOD